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FOREST EDUCATION UNDER FIRE

By R. Y. STUART

President, Society of American Foresters

The editorial by Raphael Zon on Forest Schools in this issue of the Journal demands the earnest consideration not only of forest educators but of the profession generally. In a clear, forceful way, Zon points out what, to his mind, are weaknesses in our forest educational work and the serious results to be expected from them—to the student, the profession, the school, and to forestry. Despite the apparent harshness of the editorial, it rings with the sincerity of conviction and the keen desire of the author to render his profession a telling service at the risk of personal disfavor.

Such a challenge must not go unanswered. There is no more earnest, conscientious, hard-working group in our profession than those devoting themselves to forest instruction. Each of us is debtor to school and instructor for the ground work of his professional career.

None will deny, however, the right of every forest school student to a thorough scholastic preparation for his life work. It is a professional responsibility and duty to see that he gets it, and the forest educators among us should and will be the first to fight for him in the getting of it.

Despite the youth of our forest schools and the progress they have made under most trying difficulties, which Zon will readily admit, foresters will be quick to meet such fundamental issues as they arise. Above all, they will expend themselves to assure forest students and the profession an acceptable minimum service in forest education commensurate with the growing needs of forestry. Are they getting it?

OUR FOREST SCHOOLS

This country of ours is blessed with some twenty-five forest schools. In these schools about 1,768 students are being taught by 105 teachers of forestry. They sent into the world, in 1926, 339 graduate foresters, and the attendance is on the increase.

In spite of all this superficial growth, there is a widespread feeling that something is gnawing at the vitals of our forest education. There is some dissatisfaction with its results on the part of our more thoughtful students, on the part of administrative forest officers both in the Federal and State services, on the part of scientific institutions and experiment stations, on the part of lumbermen who employ foresters, and on the part of the forest schools themselves who have to use their own products as teachers.

We may create national and state forest policies, develop programs of forest research, dream of great forest schools; but without a competent and well trained body of professional foresters all these plans will remain mere scraps of paper. No water can rise higher than its source and no profession can rise higher than the fountain spring of its training—the school. The future of forestry is too much bound up with the level of our forest education to permit us to shrink from a cold blooded analysis of the truth as we see it regarding our forest schools. It may be a painful process, but it is only through pain that we purify our souls.

It is not an insufficient curriculum that is sapping the vitality of our forest schools. It is not the crowded condition of the classrooms or the lack of laboratory facilities, although this lack is a factor. *It is the incompetence of a considerable portion of the teaching personnel*,—a sufficient portion, we are compelled to add, to dilute the quality of most of our forestry education.

In the early days of the Forest Service the best men went into the development of the National Forests. Too many of the misfits drifted into teaching and forest research. This phenomenon is not of course confined to forestry: education and research in many fields have too often attracted men who are not fitted to struggle in the front trenches of life and who at the same time have not sufficient compensating advantages to make them do first-rate work even in their chosen fields. Vigorous institutions weed out these men, just as forest research in its vigorous development of recent years has been purging itself of this handicap. Unfortunately many of our forest schools for one reason or another have failed to strengthen their personnel.

The Editor is not inclined to look upon a man who is able to put a Ph.D. after his name as a paragon of wisdom and knowledge. Yet this degree does serve to some extent to indicate the time and the effort he has devoted to preparing himself for the work before him. Of the 105 forest teachers only six have a Ph.D. degree. Of these only three have had an undergraduate course in forestry and practically none of them took their graduate work in forestry proper. They are either forest entomologists or forest pathologists. Seventy-one have a master's degree, mostly an M.F., upon which some of our own scientific colleagues look with suspicion as not a true master's degree since it is in some cases given for *undergraduate* work in forestry. Twenty-eight have no training other than undergraduate work.

If a comparison is made with the teaching staffs of an agricultural college or an engineering college, the reverse is usually the truth. About a quarter of the teachers have Ph.D. degrees; comparatively few are limited to bachelor degrees, and these men are mostly in the more practical or applied branches of their sciences. In the scientific and academic departments of our universities the average time spent to prepare oneself for the teaching job is still greater. In spite of the lack of advanced training of many of the faculty members, 18 of the 25 forest schools conduct forest research and give advanced degrees in forestry. The average number of teachers per forest school is about four, which means that in some schools one man attends to all the teaching of forestry, and that teachers must take on subjects for which they are neither prepared nor have the inclination to teach. Is it a wonder that much of what they teach is high-school stuff, and that on many campuses they are not classed with the scientific fraternity?

To insufficient original preparation of many of the teaching staff as a cause of the weakness of forestry education must be added their detachment from the progress of forest research and forest practice. Many of the schools have been out of the current of the forestry development of the past 20 years; many of the teachers do little or no work in the woods, aside from the students' field exercises; and as a result too much of our teaching is not enlivened by first-hand knowledge or a critical attitude.

The time is passing when all graduates in forestry find jobs awaiting them. Out of 339 foresters graduated in 1926 only 167 took the U. S. Civil Service examination and of these only 72 have passed

and presumably got jobs. What the rest are doing is shrouded in obscurity. From the statistics available from some forest schools regarding their alumni, it appears that about 50 per cent who received their bachelor's degree have gone into other lines of work.

As long as the agitation for forestry throughout the country continues, our forest schools will be filled with enthusiastic young men, especially if the courses themselves are not too exacting. An educational institution, however, should concern itself more with what goes out of it than what comes into it, for otherwise it is headed toward professional bankruptcy. The development of public and private forest management as well as of research has reached the stage where higher professional qualifications are demanded.

Some of the weaknesses of our forest schools are the weaknesses shared by them in common with many of our state universities. Higher education has tended more and more to mass production, with a consequent lowering of scholastic standards. For this, the forest schools are not to blame. They can not be absolved, however, from their complacency in accepting standards of teaching that can produce only mediocre results.

What is the remedy? Other lines of professional education have gone through the same process; but some of them—such as law, medicine, dentistry, and pharmacy—have by drastic measures extricated themselves from this position of inferiority. The Simon Flexner report was a turning point in medical education. Just at present, the forestry profession is looking with keen interest toward the investigation conducted by a Committee of the National Academy of Sciences as a new road to salvation. We hope and believe that much good will come from this investigation. Salvation, however, lies within the profession itself. It must pull itself up by the straps of its own boots. Grave crises demand heroic measures. We have too much implicit faith in the strength of the profession itself to believe it would flinch before any measures that would lead it to a higher level and enable it to function in accordance with the importance of its task.

Forest education is not a matter of concern only to the forest schools. The profession owes it to the young generation of on-coming foresters, to its own standing, and to its own usefulness that the training of future foresters should be as thorough and on as high a level as intellectual and material resources can make it.

And here is a suggestion.

The medical, the dental, the legal, the pharmaceutical, and other professions have found it essential as a means of raising the level of education in their respective professions to undertake the grading of their schools into three classes, A, B, and C, in accordance with definite standards. This grading, which is constantly revised as the schools change, has proved a most powerful weapon to weed out the weak, encourage the strong, and raise the average level of all. Such grading requires a group of men of infinite charity, exceptional fairness, extreme impartiality, and unbending firmness. In some of the professions the grading of the schools is now officially accepted even by the United States Government and the decisions of the grading boards are unquestioned. In others the grading has only a moral influence, yet it is almost as powerful as the officially accepted grading.

These professions have found among their members men whom they are willing to entrust with this delicate task. Certainly within our own profession there are men in whose fairness and judgment the profession could trust to carry out a similar task. In one profession a member of the committee happened to be the head of a certain school whose standing demanded placing it in a low grade. This man accepted the decision of his own committee; but in a few years, through untiring efforts, he brought his school up to the top in its field. This is the type of men needed on such a committee in our own profession.

Such a grading would also be a most effective lever in the hands of forest educators themselves for improving conditions in their schools. How long could a dean or even a president of a university stand the pressure from the white light of such publicity, and remain content, while perhaps maintaining a grade A medical school, to hold the forest school down to grade B or C?

The forest schools earnestly striving to raise their level have nothing to fear from such a committee; they would welcome it. Those forest schools that are unwilling or unable to rise to a high level, could, without loss to the profession, be eliminated altogether.

A tentative and very incomplete poll made among members of the Society as to the order in which they would grade existing forest schools irrespective of their own allegiance to their Alma Mater, showed that only two schools of the 25 were placed in Grade A, and even then not with entire unanimity. The rest fell between grades B and C. This possibly does not represent a fair cross section of professional opinion, yet it is indicative of the low estimate which foresters themselves place on the forest schools.

We do not propose that this grading should be hastily adopted. We need lots of discussion as to what the standards should be by which the schools can be graded. We must study how the other professions have solved this problem since their experience may guide us in dealing with this question.

It is a task of the utmost delicacy, yet it is a task that may be productive of immense good and can help the forest schools themselves to higher usefulness. We believe the profession could undertake no more important task nor one more conducive to its own welfare than to grapple with the basic problem of forest education.



Clifford Robert Pettis
1877-1927



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CLIFFORD R. PETTIS

In the passing of Clifford Robert Pettis the profession of forestry has lost a stalwart leader. His sudden death on January 29, 1927, brings sorrow to a host of friends and acquaintances throughout the United States. The work that he began and developed will go on, increasingly, but the place that he held in it can never be filled.

Among the features that characterize Pettis' work three stand out in particular; his skill and enthusiasm as a forest planter, his ability and wisdom in the building up of the New York State Forest Preserve, and his discovery of the White Pine Blister Rust and leadership in the fight against it.

In the technique of raising forest nursery stock Pettis was pre-eminent among American foresters. The methods he devised and perfected have become the standard of practice in the propagation of conifers. His bulletin, "How to Grow and Plant Conifers in the Northeastern States," Bulletin 76 (old series) of the U. S. Forest Service, is admitted to be the standard publication on that subject. The forest nursery at Saratoga, N. Y., started by him in 1912, is said to be the largest forest tree nursery in the world.

To his contagious enthusiasm may be traced no small part of the present day interest in forest planting, not only in New York but throughout all the eastern states. From simple beginnings in 1902, he brought the annual production of the State Nurseries of New York to a total in 1927 of between 25 and 30 million trees.

Not less to his credit is Pettis' work in the acquisition of land for the New York State Forest Preserve. New York has the distinction of having the largest area of any of the states of state-owned forest land. The total at present is somewhat over two million acres. During the last ten years Pettis controlled and directed the expenditure of the purchase funds provided by New York for this work; altogether a total of approximately eight million dollars; or for the decade, approximately one million dollars a year. Very many intricate problems had to be solved in the acquisition of these lands, including knotty legal questions and complex business situations. At the start Pettis worked out a method of procedure whereby all forest land transactions were conducted in the open and subject to public scrutiny. Throughout his 25 years of service in the New York Conservation Department, and its predecessor, the Forest, Fish and Game Commission, no breath of suspicion or even of adverse criticism was ever directed against his expenditure of these large sums of money.

The acquisition work was no easy task. Again and again Pettis fought valiantly for the people against self-seeking interests. Probably no man had a more intimate and detailed knowledge of the forest lands of New York than did he. He was untiringly on the job. By one who, as a seller, had repeated dealings with him, Pettis has been characterized as possessing the trait of "courageous honesty." He was ever ready and never afraid to demand, and, if necessary, to fight for the rights and interests of all the people. It is appropriate and fitting that his final resting place should be in the forest he loved, in the midst of the Adirondack Preserve.

In 1909 Pettis discovered the White Pine Blister Rust and took immediate action to arouse the foresters throughout the Northeast to the danger of this pest. In the Blister Rust Conferences held in 1909, 1915, and 1916, it was Pettis' forceful advocacy of the practicability of control measures that led to the putting into effect and the continuation of a sound control program. Until his death he continued to wage an unceasing fight against this serious disease, with the result that not only in New York, but throughout its range, White Pine is now being protected in an effective and economical manner.

Pettis' accomplishments did not stop with these branches of forest work. He was responsible for the development of the highly efficient system of forest fire prevention that now obtains throughout New York State and for other and diversified activities in the Department of Lands and Forests of the Conservation Commission. He directed the most successful fight any state has ever made against the Gypsy Moth. His foresight enabled New York to meet the menace of this insect and his action has pushed back the insect hordes from New England before they could do appreciable damage. If the Gypsy Moth can be held east of the Hudson River, as now seems probable, a notable service will have been rendered to the states lying to the west and south of New York.

Pettis had charge of the first steps taken really to develop the recreational facilities of the New York Forest Preserve, a work that is deeply appreciated by the woods-loving public. In addition to his bulletins on reforestation and on the Resources of the Forest Preserve, he wrote the first four of the Recreational Circulars put out by the Conservation Commission, as well as a long series of annual reports that contain much information about the forests of New York.

Clifford Robert Pettis was born Aug. 10, 1877, at DeLancey, Delaware County, New York. He entered Cornell University in 1897, as

a student in the old New York State College of Forestry, under Dr. B. E. Fernow. He was graduated in the second class, in 1901, with the degree of Forest Engineer. Throughout his life he displayed an active loyalty to his Alma Mater. As a student assistant, Pettis served in the then Division of Forestry of the United States Department of Agriculture (later the Forest Service). In 1902 he entered the New York State Forest, Fish and Game Commission, under Col. Wm. F. Fox, as State Forester, serving under him until 1909 and under Austin Cary in 1909 and 1910. He succeeded Mr. Cary as Superintendent of State Forests in June, 1910. This position he held until his death; thus giving to his native state a quarter century of devoted service. He was married in 1904 to Miss Maude E. Otis, who with one child, a daughter, survives him.

Pettis was the first Chairman of the New York Section of the Society of American Foresters and served for the years 1918 and 1919. He was an active member of the Association of State Foresters, and for years a member of the Executive Committee of the New York State Forestry Association. His passing leaves a gap in the ranks of the forestry profession in New York that will be hard to fill, for Pettis possessed, beside his ability as a forester, a personality that attracted men to him and made them his life-long friends. Of characteristic speech and manner, "Cliff" Pettis was known and loved by a very wide circle.

Taken in the prime of his mature manhood and from the midst of his many interests and activities, he leaves a record that will long continue to be an inspiration to his associates and to those who follow in the profession and carry forward the work that meant so much to him. His best memorial is the two million acres of forest preserve land that he leaves to the State of New York, wisely selected and dedicated to the perpetual use and enjoyment of his fellow citizens.

In recording this tribute to his memory, the Society of American Foresters expresses its deep and sincere appreciation of the value of the services rendered by Clifford R. Pettis to Forestry in America and its sense of his worth as a forester and as a man. To his wife and daughter the members of the Society extend their profound sympathy in this hour of their bereavement.

THE NEXT GENERATION

By R. D. FORBES

Director, Southern Forest Experiment Station

The greatest problem today before the American profession of forestry is that of personnel. The future of America as a wood-using nation does not lie in forestry laws on the statute books; or in public ownership of forests as contrasted with private ownership, or vice versa; or in great appropriations for fire protection, or for planting, or for administration of forest land. These are but the instruments through which forestry—timber growing and timber conservation—may be practiced. The future lies in the foresters themselves. Without men thoroughly equipped by character and training to practice their art, the whole elaborate forestry machine will run at only half speed.

The question is: are the foresters the men they should be, and are they getting the education they need to run the forestry machine at full speed? I hope it will be clear from what follows that by "education" I do not mean simply that which men obtain in the schools, but throughout their careers. The wise long since learned that their education is never finished.

THE FORESTERS' SHORTCOMINGS

Better men than I in times past have questioned the ability of the school-trained forester to perform the great task before us. In 1918 Kneipp (1)¹ threw a bombshell into the professional ranks by pointing out some of the weaknesses in school training for forest work under the conditions then existing in parts of the West. He aroused the ire of the school graduates by stating that as a result of their poor training the technical men, so-called, were losing out. Kneipp's paper caused many pages of worth-while discussion in the *Journal of Forestry*. To me the weak point in the paper was the assumption that conditions would remain the same indefinitely, and the implication that there was therefore no great use in attempting to salvage anything out of the wreckage. That the technical men were worth retaining in the Service and *educating* in some of the matters wherein they were quite naturally ignorant, against the day when their background of school-taught forestry would be in very real demand, apparently did not occur to this iconoclast. Some believe that his utterance was simply an expression in bald terms of a philosophy which had long been current in the Federal forest serv-

¹ Numbers in parentheses refer to the bibliography, p 280.

ice. The years before the War were lean years in that organization for the school-trained man, and it is no secret that the Service feels as a result today a serious lack of seasoned technical men. Forest school graduates are few indeed who have been schooled by administrative experience in those matters wherein Kneipp found them weak, yet have retained their technical interest, and the scientific point of view necessary to the tasks now lying before them. In a letter to the district foresters on April 15, 1925, Chief Forester Greeley said: "Too many of our men go stale in technical interest. Too many who come to the Service from the forest schools do not grow in technical ability as they should."

Criticism has not abated in more recent years. President Mulford (2) in 1924 told the Society of American Foresters that "We are no further advanced because we have not had more strong men, and because the rest of us have not been more nearly master workmen, no matter how humble our niche." No better proof that the profession lacked "strong men" could be found than the amazing fact that a majority of the executive committee of the Society at that time favored so pusillanimous a policy as avoidance of taking a position on matters of public forest policy. They argued that "if it (the Society) took such a stand and later developments proved they were wrong, the influence of the Society would be discounted." This attitude was later roundly denounced by Moon, from whom I quote (3). Olmsted had earlier (4) said: ". . . considering the profession as a whole, foresters have lacked that vital influence for progress which comes from united effort, from the group spirit." Even as he replied to Kneipp in 1918, Winkender admitted (5) that ". . . the profession has not yet gained the standing in the scientific and technical worlds that it should have gained. And we must recognize as a fact that it has not."

THE DEARTH OF TRAINED MEN

These are published statements by men widely known in the profession, two of whom have been the choice of the Society of American Foresters for president. It is evident from them that the professional foresters of past years have not deserved the high opinion we are wont to have of ourselves. That at least some of us have held our positions in default of much competition is a suspicion borne out by recent events. Men in the ranks, capable of stepping up when those ahead of them drop out, or of taking new jobs of similar requirements when they are created, are extremely hard to find. These jobs, particularly in certain

portions of the country, have multiplied amazingly in late years. In the Coastal Plain section of the South, south of North Carolina, for example, only three or four school-trained men were practicing forestry in 1916; today there are between 35 and 40.

In certain lines of work vacancies have been especially numerous and hard to fill. The reorganization of silvical research in the Federal forest service following the War, and its comprehensive plan for establishing forest experiment stations in each of the important timber producing regions of the United States, created a demand for foresters having not less than a master's degree in forestry, or equivalent post-graduate training in the fundamental biological or soil sciences. Since that time the program has been pushed with an energy which augurs well for at least partial completion within a year. By partial completion I mean the establishment of a station on an appropriation of between \$25,000 and \$40,000 in each of the ten main forest regions of continental United States. At present, with but eight stations organized, a modest total of between 40 and 50 trained men are employed either at the stations or in overhead positions. Surely this is no great multitude when compared to probably 50 times that number of forest school graduates to date, and a yearly grant of perhaps 150 forestry degrees. Yet from the very beginning one of the greatest obstacles to the effective work of the experiment stations has been the difficulty of finding a suitable personnel. What amounts to training on the job has necessarily been the mainstay of some units. It would have been literally impossible to man from all available sources more than two new stations—a maximum of 10 positions—in any one year, if reasonable standards were to be maintained. These standards include a thorough training in silviculture, a sure grounding in the underlying sciences, particularly botany, and an open and inquiring mind.

Again, in 1924 Congress passed the Clarke-McNary Law, and in the succeeding year provided the necessary funds for the employment of a considerable number of extension specialists in forestry. Their function was to bring forestry to the farmers. Surely here were jobs which should be relatively easy to fill, if the foresters' oft-repeated dictum that forestry is a branch of agriculture holds any truth, and if the forest schools included among their recent graduates a proper proportion of farm boys. As a matter of fact, however, they were so difficult to fill that in some states they were given to men of no professional training at all, when local prejudice against outsiders was reinforced by a dearth or total absence of trained applicants.

Advocates of private initiative in forestry as opposed to public regulation must view with concern the apparent lack of men capable of "putting across" a program of private forestry with the average skeptical lumberman or large landowner in timbered regions. It is true that a few firms or individuals of grey hairs (figuratively speaking) and long experience have of late been conspicuously successful in this field. They have interested such "prospects" in a thorough-going stock taking and appraisal of growth, and on these bases have formulated a plan of ordered management without which it is ridiculous to talk about any intelligent landowner's "practicing forestry." But how many of the younger men, privately employed, have been able to make any headway toward the same goal, and to avoid being side-tracked into timber cruising, running land lines or railroad spurs, or utilization problems? That the job is a peculiarly difficult one for inexperienced men will be granted, but that alone does not justify the failure.

In yet another line of forestry work the foresters fail to qualify. Whatever merit there is in the recent contention that the profession is more inclined to talk than to do, surely no one will say that we talk as well as we should. When a publicity job is created in state or federal forestry departments it is necessarily filled not by a forester but by a newspaper man. All that is expected of the latter is the most superficial acquaintance with forestry, and the average newspaper man's cocksure faith in the sufficiency of superficial knowledge. As a make-shift this may do, but the trouble is that it is rarely regarded as a make-shift; too often it is complacently looked upon as a thoroughly satisfactory and final arrangement. The result is that which sooner or later follows the superficial and make-shift handling of any job. Butler complains (6) that the average forester lacks any sense of news values; is it not fundamentally due to his gross ignorance of writing?

RECENT GRADUATES NO IMPROVEMENT

Are the recent graduates of our forest schools any better equipped than the earlier ones? If I were the only forester to entertain doubts as to the quality of the current forest school output, I might have the wisdom to ascribe my feeling to chronic radicalism, or to that state of mind (in the psychologists' jargon that "complex") which delights to compare the present to the past, to the extreme disadvantage of the former. On the contrary I have heard more than one man in a position to know whereof he speaks express the same doubts. The head of one of the newer but more successful schools, himself a veteran of

influence and popularity, told me about two years ago that he was gravely concerned by the drop in quality of the men entering his school—their unwillingness to “rough it,” their concern over the relatively low salaries in forestry work, and in general their lack of idealism and enthusiasm over a cause. I recently overheard another old campaigner, a semi-official member of a forestry faculty, ask a forest school professor the pertinent if inelegant question: “Why are the forest schools so rotten today?” The American forester perhaps best posted on the annual “crop” of Forest School graduates is emphatic in his criticism of the average of these for his superficiality, his inability to express himself, his ignorance of first principles.

Needless to say it would be ridiculous and most unjust to classify all of the new bachelors and masters as men of inferior ability and personality. I have been fortunate enough to meet a few young fellows who will some day be as good or I hope better men than any of us of an earlier generation. Such as these are doubly welcome because they are found all too often in melancholy company.

It is not difficult to account on theoretical grounds for the lack among the most recent graduates of certain traits which were characteristic of the majority of the first American foresters. The early days of forestry were stirring days. The “strenuous life” (forerunner of the “Red Gods,” “he-men,” “the great open spaces,” and similar phenomena) had gripped the imagination of the American youth. The National Forests of the West—there were none elsewhere—were almost the last frontier. There were then no roads into them, nine-foot or other wide. There was practically no closed season, at least in the popular conception, on forest supervisors. The lumbermen were all predatory, and the stockmen all hostile. A golden halo of romance hung about the head of a forest ranger. Is it any wonder that along with a few hare-brained enthusiasts and an occasional misfit, a pretty virile bunch of young men stormed the doors of the first forest schools? And that in due time these same young men emerged into professional life tolerably well-equipped for the relatively elementary work then before them? Roth, Fernow, Graves, with the best of European training and what was then a varied experience behind them, built broadly and well at the first schools.

Since the early years of the century conditions have changed. The novelty has somewhat worn off the strenuous life, or the life itself has become less strenuous, owing to flivvers, and roads on which to run them ~~in~~ to even the most remote corners of the West. The lumbermen

and the foresters have discovered that neither group has a monopoly on public spirit or common sense, and except for an occasional friend of the administration the stockmen are ready to agree that the foresters' unsought task of regulating grazing on public lands has been honestly and on the whole efficiently performed. Their rendezvous, if not with Death in France, at least with mud, and sweat, and discomfort of camp life in America, has most decidedly "fed up" several classes of forest school men with those very aspects of a forester's work which had their strongest appeal for the earlier graduates. The A. E. F. tradition has been handed down to younger brothers as well as to many others of the present-day classes. Finally, Fernow and Roth have passed; Graves has largely withdrawn from actual teaching. It would not be surprising then, on theoretical grounds, if we were to find ourselves in a trough of the sea, relative to the earlier crest, with respect to the quality of the men entering forestry today.

WHERE THE BLAME LIES

If it be true—as I believe it is—that the earlier professional foresters have by no means measured up to their opportunities for service, and that the new men show small signs of raising the average, it is high time that we asked who is to blame.

1. THE FOREST SCHOOLS

The forest schools are no doubt partly at fault. They have committed what appear to me to be sins both of omission and commission.

One of their common practices has been roundly condemned by every thoughtful forester. It is that of recruiting faculties from lads barely out of school, and what is just a little worse, out of the same school. That such men, no matter how brilliant they may be, have not the first-hand knowledge on which to build a career as professor of silviculture, or forest engineering, or forest products, is so obvious that none will argue to the contrary. Yet some are hired every scholastic year not simply by the weaker schools, or the undergraduate schools, but by the strongest graduate institutions! It is really incredible that this blunder is so often repeated.

In addition to cutting themselves off from what might otherwise be new accessions of current information—for that is precisely what the hiring of inexperienced men amounts to—the schools may rather generally be accused of failure to keep in touch with the profession for which they are equipping young men.

STABILIZATION AND ITS DRAWBACKS

The stronger schools long since stabilized their faculties, so far as the higher ranks are concerned. Now within certain limits stabilization is of course a highly desirable process. But it also involves the great danger that its beneficiaries will lose contact with practical affairs. The word practical is much abused, and I should be the last to insist that even a professional education be wholly practical in the commonly accepted sense. What I mean by losing contact with practical affairs is a lessened knowledge of what the profession is doing and being called upon to do.

These stabilized faculties do not always read. Men have grumbled before this that the typical bibliography attached to a school publication contains nothing recent either at home or abroad. A well-known professor lately delivered a paper on root competition in the course of which he blandly ignored some late work by a very competent American, and referred to Robert Hartig and other European worthies of an earlier century.

Within the past five years no less than four members of the United States Forest Service have published worth-while discussions of the recent problems of the naval stores industry. Yet I am told that the stock in trade of a lecturer on this industry at one of the graduate schools continues to be the iniquity of boxing timber when cupping is so much less wasteful. As if, among other factors, the small size of the trees the chipping of which today constitutes the chief menace to the industry, had not long since almost eliminated boxes! No less a man than Roth in 1920 still warned against clear cutting with seed trees in the pine forests of the South, because experience elsewhere chorused "Windfall." This was in spite of the publication of several state and federal bulletins recommending large but of course not indiscriminate use of that method. Among these was what is perhaps the most comprehensive bulletin in American forestry literature: Ashe's *North Carolina Pine*.

These stabilized faculties do not always travel. (That, however, is not why I describe them as "stabilized.") Or if they travel for purposes of keeping in touch with current practices, they too much resemble the great American tourist in their zeal for speed rather than understanding of what they see. On the basis of nearly ten years' residence in the far South I feel safe in saying that within this time not a single member of any forest school faculty except Yale's has spent any substantial period in a study of forest conditions in that region. Georgia

and Louisiana are, of course, not counted. Possibly the written word of two years ago that this region is destined to produce under intensive forestry about a third of the Nation's wood has not yet penetrated to the Groves of Academe. On how many occasions have school men spent their sabbatical years, or even their summer vacations, actually *working* in forestry? Anything less than actual participation in a job in the woods or laboratory is productive of only superficial knowledge; a few weeks in a great forest region, though the notebook be constantly in hand and the eye keen, is only a glorified junket, good for self-education perhaps, but a slender reed to lean upon in the instruction of others.

The need to spend sabbatical years and summer vacations in writing forestry text books may reasonably be claimed by some hard-working men as sufficient cause for absence from the woods. Anyone looking over so monumental a work, for example, as Chapman's *Mensuration*, will realize the time consumed in the mere physical process of getting the material on paper, to say nothing of the planning and the study involved. It is hardly fair, therefore, to blame the forestry faculties for not spending more time in actual professional work, when writing about it has been so time-consuming a job. But the field of forestry literature has now been fairly well covered. To supplement the Sargent's *Manual*, Graves' *Mensuration*, and Graves' *Handling of Woodlands*, which were almost the only forestry texts of 15 years ago, we have today at least one serviceable publication in every important subject except that one basic to all—silvics. Is it not time for the professors to rediscover American forests and forestry?

In some instances the argument may be advanced that outside consulting work, done continuously throughout the scholastic year, is giving teachers of forestry all necessary contact with practical affairs. Such work is good as far as it goes, for no doubt all of the essentials of forestry may be illustrated and practiced in one tract of a few hundred acres. But it is far from being enough on which to base a course dealing with the silvical problems of the United States, and designed for men whose future work may take them into any one of 40-odd states.

It might not be unreasonable to expect that the schools would take cognizance of the very vigorous rehabilitation of Federal forest research which has been going on in the past five years, and make a special effort to train men for forest investigations. If there has been a conscious effort along this line its fruits have not been abundant. Perhaps the schools are waiting to hear that there is such a thing as forest re-

search in the United States from so authentic a source as the National Academy of Science.

It is not simply with forestry that the forest schools have failed to keep in touch; it is with the whole of science. I have elsewhere (7) recorded the fact that not a single teacher of forestry attended the last meeting of the American Association for the Advancement of Science in Kansas City. The International Congress of Plant Sciences at Ithaca last summer attracted representatives of but four schools, Cornell itself being one.

FORESTRY THROUGH ROSE-COLORED GLASSES

Another error of serious consequences committed by at least some of the schools is their failure, as pointed out by Herbert (8), to tell their students the full truth concerning the profession of forestry. In a recent Forest School publication (9) I set forth some facts concerning it which are familiar to all men who have earned their bread in it for any length of time: that incomes after the first few years are small relative to those obtainable in law, medicine, or engineering, for example; that living conditions are not always ideal; that without a genuine love for the woods and desire to serve his fellow man while serving himself no man can succeed in forestry. I was taken severely to task by a friend (not a professor) on the ground that an occasional forester makes excellent money, and that lots of other professions, such as mining engineering, require that men live in isolated places or under unattractive conditions! Yet I have no doubt at all that for the reasons Herbert gives many a forester-professor paints for his students glowing pictures of life in the woods, recites the opportunities for men to obtain jobs at good salaries, and in general "boosts" the profession indiscriminately. The plain facts in the case are ignored both by the weak school whose enrollment is at best precarious, and by the "bigger and better" institutions whose general policy and whose overload of physical facilities compel them to give the size of their enrollment first consideration.

Finally, the forest schools have so far done little to encourage graduates of some years' standing to return for advanced or specialized work. Few men while yet in school know what branch of forestry they will eventually follow. Hence they stick pretty much to the general course. This is far from being grounds for lamentation, since the broad point of view which results from general training, followed by a variety of work, is invaluable in after life to any man. But such recent developments as the rehabilitation of silvical research by the Federal gov-

ernment, already referred to, has placed a premium on specialized training along many lines, and many men of maturity and experience would be glad of the opportunity to return to the universities for it. The fact that it may not be feasible to grant degrees for such work will deter men but little; it is the cost that hurts, particularly among those men who have "given hostages to fortune." I cannot believe that present scholarships and fellowships at the forest schools represent the sum total of what they might do, did they realize the situation and the demand. That they have not anticipated it is fresh proof of their lack of contact with the world of forestry about them.

2. THE SOCIETY OF AMERICAN FORESTERS

The second delinquent in the present unsatisfactory situation is the Society of American Foresters. For years the committee on education of that association pursued if not a serene at least an inarticulate way. Up to 1925 its chief activity seems to have consisted in subdividing itself into an infinitude of sub-committees. The very function of some of these has been a mystery to their members. I know, for I have been on such a sub-committee; it would be an exaggeration to say that I had "served" on it.

The 1926 committee promises better things (10). Few, however, will share the complacency with which its chairman records the unwillingness of the average student to spend more than four college years learning his life's craft, and describes "a more or less general spirit of indifference toward real culture" among college students. "It is merely the spirit of the times," quoth Winkenwerder! The hopeful feature of his report is the statement that "The great difficulty in connection with the content of the (forest school) courses during the next few years is going to be to keep them fully abreast of the times," and that "a similar problem will be presented as a result of the extension of research in silviculture *now* being organized." (The italics are mine.)

EDUCATION IGNORED

The formulation of a program, or list of objectives for the year, by this year's executive committee of the Society offered another opportunity for service to the cause of education. Inasmuch as the formulation of any program at all—and on the whole so excellent a program—is a real forward step, it may seem ungenerous to criticize omissions from it. But surely among ten projects deserving the attention of the Society for the modest space of a year might be numbered the improvement of forestry education.

Had the Society given the thought to forestry education which the subject deserves we might by now have set up the machinery for an impartial rating of the forest schools. The medical schools were long since so rated, and the dental schools more recently. Other professions have at least some recognized means of judging the quality of their schools. Rating of the forest schools would serve the immediate purpose of enabling all of us to steer to a qualified school a young man wishing to enter the profession. At least it would permit us to state the facts with respect to any particular school upon which our opinion is sought. In the absence of anything of this kind a variety of motives prevents most of us from expressing forthright opinions.

The profession's failure to set up definite requirements, both in men and equipment, for a first class school has made it extremely easy for feeble departments or schools of forestry to spring up at many an institution which had little justification for entering the field. There has been nothing to prevent an institution from claiming to train "professional foresters," although its forestry faculty may consist of one teacher, or it may lack the standards of a college altogether. More than one excellent forestry faculty has been found at an institution in a state which has practically no commercial forests, and where the vitally necessary "laboratory" facilities—the woods themselves—are many miles distant. Nor is the practice of opening ill-advised schools by any means a thing of the past. Within the year a group of lumbermen of philanthropic bent and subject to embarrassingly large federal income taxes have talked of endowing a chair of forestry at an institution in their state. The state is one in a region which is already supporting two schools, although very inadequately, and needs no more. Moreover, the benefactors seem determined to place the chair at an academic rather than an agricultural college, where the incumbent would at least have allies in several fields of science. They have ignored pleas to throw their aid to one or both of the existing regional schools, and thus to bring them to higher levels. Warning that a forest school can not be built on a single chair has been in vain. The foresters' advice has lacked weight because it represented the opinion of individuals only. On the requirements and desirable affiliations of a first-class school there are no official pronouncements of any organized body of foresters available.

3. THE PROFESSION AT LARGE

The final responsibility for a serious situation rests, however, upon neither the schools nor the Society of American Foresters. It rests

upon you and me—the rank and file of the profession. If we were genuinely interested in the training of men, both at the schools and afterwards on the job, the schools and the Society would be alert.

That we are not interested in these things is evident in many ways. Since 1918, when Kneipp's pronouncements caused us a modicum of soul-searching, the pages of the JOURNAL OF FORESTRY contain, according to my count, seven articles on the academic phases of forestry education. This is approximately one a year. On broader topics, which include one or more of the matters touched upon in the present article, men were moved to write perhaps ten times. The total percentage of the JOURNAL devoted to any phase of education has approached that immortalized by Mr. Volstead. In this instance at least I am unaware of any bootlegging.

If current gossip is to be trusted, the directorship of one of the country's most successful forest schools has remained vacant for four years not simply because of lack of men capable of filling the position, but because the extreme importance of its being filled has not been grasped by either the men approached or the profession at large. Could the headship of one of the three or four leading engineering schools of the United States have remained open a like period, while its reputation dimmed and dissension divided even the student body? Would not public opinion among engineers, whether of that institution or of another, either have exalted the position to a point where few men could bring themselves to refuse it, or have practically forced the institution to meet whatever terms the man really needed for the job might prescribe? The foresters, however, have not been interested.

A single incident, trivial in itself, illustrates the indifference of the profession at large to the schools and the next generation of foresters.

A responsible forestry position was recently created in a section of the United States where there is an acute lack of trained foresters and the most patent need for good forest schools. Those charged with filling the vacancy decided on a certain man, if he could be obtained. They found that he had been singled out by one of the forest schools in the region as the mainstay of its teaching staff. He was unquestionably the best, and almost the only available man for the job. Negotiations were then under way between him and the school. In spite of the fact that their organization had time and again found it impossible to fill vacancies in the same region with men familiar with its conditions, and in the face of entire agreement that only well-manned forest schools in it could adequately remedy the situation, these

foresters did not hesitate to make the men competitive offers. The wrecking of the hopes of a forest school—for the university was in no position to meet strong competition with high salaries—did not count at all with these foresters. Yet they were men of long experience, and in a line of work where thoroughly trained men should be at a premium. Theirs was, I believe, simply the typical attitude of the school-trained forester.

THE THOUGHTFUL "BOSS"

Far outweighing in importance our general indifference to the student of forestry and his school, is our failure to play our part in his after-training. The school can go only so far with any man. But a thoughtful administrator, wise in human nature as in silviculture, can give him such training in the actualities of forest work as no school can ever furnish. When I say that I owe my greatest debt for professional training to my first "boss," I am only saying what is true of many another forest school graduate. He is a man loving youth for its own sake; keen to recognize both capabilities and limitations, capitalizing one and discounting the other; giving credit and blame on the spot; and devoted to the ideal of public service vitalized by "G. P." He was—and is—a teacher in the truest sense of the word.

But how many of the average run of foresters deserve this description? How many of us see in the young, sometimes callow, holder of a recent forest school degree something more than the chap necessary to complete the summer's reconnaissance crew, or to "piece out" in a dangerous fire district, or maybe draw a few maps in the office before going out to help Ranger Jones on the Sourdough District? Yet such the best of us once was. Some would have been the best in spite of a thoughtless first chief. Others are the best because of a thoughtful one. In spite of this I have yet to hear of the forestry organization which lays pointedly and unequivocally upon the head of each unit the training of new men as his most important task. Is there any more important? Yet the average man in a responsible position thinks his time "too valuable" to spend on a lad fresh from school. He may not be able to work with the young man personally, but at least he can select the most discerning of his subordinates to take this raw material in hand, and can investigate at intervals to make sure that the utmost is being made of it.

THE REMEDIES

Some of the remedies for the situation described in the foregoing pages will be self-evident, and may be applied at the will of those con-

cerned. Ceasing to employ men to teach who have no first-hand knowledge of their own to impart is probably a case in point. But the application of even so apparently simple a remedy may be rendered impossible by the financial situation of the employing school. This leads directly to the main contention of this paper:

We need a thorough-going study of the entire subject of forest school education, and of training of men on the job. Action based on anything less than a full knowledge of the facts will not give the nation the foresters it will sorely need in days to come.

This study should cover a much wider field than that outlined for 1926 by the education committee of the Society. Possibly the results of the committee's efforts would serve for part of the field, specifically the graduate schools. Neither the committee's plan nor this concerns itself with the minutiae of curricula. My idea is to answer for the forestry profession the question which prompted a study now under way by the Society for the Promotion of Engineering Education: "What can the Society do in a comprehensive way to develop, broaden, and enrich engineering education?" Moreover, I believe the study should be continued beyond academic walls, and embrace education in its widest sense—the training of men throughout life.

The survey of engineering education just referred to might be used as a model for our own. First of all it is necessary to decide upon an agency to carry on the investigation. Obviously no individual would be able to make a study of this kind without creating prejudices; a committee of some sort is necessary. Rather than create an additional agency I think we might turn naturally to the educational committee of the Society, already mentioned. Considering the broad scope of the investigation, however, an increase might be suggested in the present proportion of members from outside the school faculties themselves. This is at present one out of three.

THE ENGINEERS' STUDY

The objectives of the engineers' study have been broadcasted in print (11). Some of them are "to indicate how engineering curricula may be coordinated more effectively with the needs of industry and the requirements of engineering practice"; "to determine what responsibilities the colleges should assume for the further training of graduates"; "to determine what steps may be taken to insure the entrance of properly qualified students"; "to determine what measures may be taken to deal more effectively with the problem of eliminations (of

students)"; and "to indicate how methods of recruiting and developing engineering teaching staffs may be improved."

Progress reports on the study show that a great amount of first-rate information has resulted already. Much has been learned about the students themselves, particularly the motives leading them to study engineering, and to enter a given school, and how long before entrance they reached these decisions. The summarized data are intrinsically valuable even to foresters, because they are probably typical of almost any group of students entering a professional school, but space is lacking to include them.

More to the point are the following figures compiled by Munns and released in part by him in an address at the International Congress of Plant Sciences at Ithaca. It is to be hoped that he will publish further details of this most enlightening research. Munns studied the records of some 200 men graduating from the forest schools since the War, and has no reason to doubt that they were typical of the entire school output of recent years. He found that 31 per cent came from large cities, 52 per cent from small cities, 14 per cent from towns, and just three per cent from farms! Eighty-eight per cent of the boys decided on forestry as a career because of the romance attached to it, three per cent because of its healthfulness, and seven per cent because they had read enough about it to become interested. Out of 168 who gave the year in which they decided to take up forestry, one said he reached a decision before entering high school; 11 in the first two years of high school; 108 in the last two; 21 in their freshman year at college or normal school; 15 in the sophomore; eight in the junior, and two in the senior. Two decided on forestry after they graduated, subsequently returning to take post-graduate work.

The engineers' study of recent graduates has disclosed the extent to which they are actually engaged in the engineering field for which they prepared (civil, mechanical, etc.); the percentages in allied fields, in unassociated but still engineering fields, and in work totally outside engineering. (The fields analogous to these in forestry might be forestry proper, products, logging engineering, grazing, etc.) Similar percentages have been compiled of those engaged in drafting, construction, testing, etc., which might correspond to our state work, Federal work, consulting work, teaching, etc. The number of positions held since graduation has been the subject of inquiry and analysis; the motives dictating choice (if any) of first positions; earnings; the amount of study done since graduation; types of cultural interests, such

as literature, economics, and fine arts; satisfaction with the present job and future prospects; and other matters bearing upon the material and intellectual progress of the newcomers to engineering.

Study of the older graduates has concerned itself with such matters as salaries; kinds of work engaged in by men graduating from five to forty years ago; the importance attached by them to the "scientific, technical, economic, and cultural" subjects of their college courses; their opinion as to "the sufficiency of relationships between the engineering subjects studied in college and the problems and procedures of engineering practice"; "qualities sought by engineers in other engineers whom they employ," including "character, leadership, physical qualities, training in a particular course or specialty, scholastic record"; and many other matters.

In the parallel forestry field Montgomery (12) has contributed something to the study of salaries, and Ziegler (13) to the study of the work in which forest school graduates are engaged. Their data are excellent as far as they go, but they do not go far enough to serve as a guide to the profession and the schools.

Engineering teaching personnel has received thoroughgoing attention. There are data on the extent to which the teachers indulge in professional practice during the academic year, and the attitude of the schools toward such indulgence; the use made of sabbatical leaves; instruction received in the art of teaching; employment of practicing engineers as part-time teachers in the schools, and of teachers in instructing employees of industry; salaries from teaching and supplementary sources; and the extent to which vacancies on faculties are by promotion, by interchange between schools, and by recruiting from the ranks of practicing engineers. Some, but certainly not all, of these matters are the subject of investigation this year by Winkenwerder's committee.

On the basis of the facts thus obtained the Society for the Promotion of Engineering Education looks forward confidently toward the formulation of plans and reforms which will give the world in years to come a generation of engineers far superior in character, fitness, and training to the present one. It is my hope that the foresters will take their own, probably more difficult, problems as seriously.

PROBLEMS PECULIAR TO FORESTRY EDUCATION

When I say that the problems of forestry education are more difficult I have in mind the fact that engineering in its many forms

is a profession so universally practiced that a school or schools of engineering may be appropriately established at almost every university. This is far from being the case with the forest schools.

Several matters beyond the scope of the engineers' investigation, or at least beyond that of reports issued to date, should therefore receive the foresters' attention. Among them are the "laboratory facilities" and other material equipment of the forest schools, the total income available to them, and their relationship to the colleges or universities of which they should by all means be a part.

No medical college can exist apart from a hospital where the students may gain first-hand knowledge of the ailments they will later be called upon to heal, and where they may witness and participate in the operations they will some day perform. Similarly, no forest school can thrive without woodlands near enough at hand to permit the future foresters to study daily the reaction of trees to their natural environment, and their response to human manipulation. Yet there have been forest schools without forests. The failure of Nebraska to maintain a forest school was, I understand, a recognition of the abortive character of such an institution in a state which has very few forests. The forest school in another Middle Western state is rumored to be faced today by the point-blank refusal of the state legislature to support a department whose graduates can find no work within the state's borders.

Fine buildings or at least adequate quarters are desirable, but they are less necessary to a successful forest school than many other things, and the majority of the schools are not lacking in them. More important by far are good libraries, properly catalogued, and adequate field equipment for practice work.

The minimum income on which a first-class forest school may be run has a direct bearing upon several of the matters earlier discussed. The faculty of many a school is overloaded with teaching. Men find it quite impossible to do outside work, to get away for much-needed vacations or semi-vacations spent in actual forestry practice, or to attend meetings where scientific and professional contacts are made. The underlying cause is generally lack of funds.

There is probably no more important factor in the success of a school of forestry than its relationship to an institution of broad learning. Nothing but a trade school can be built in the woods, out of contact with professors and students working in parallel fields, particularly the fundamental sciences. To attempt it is to subject faculty and

students to intellectual starvation. Equally grave dangers arise when a forest school is subject to the whim of an administrative officer out of sympathy with the purposes of the school, and incapable of visualizing its needs. Yet forest schools have been related—or unrelated—to our universities in a great variety of ways. Even allowing for local circumstances, these relationships can not *all* be right.

REACHING MEN EARLY

To get to the bottom of the forestry personnel problem the researches of the Society's committee should extend beyond the forest schools in two directions. Having established by inquiries similar to the engineers' the motives behind young men's choice of forestry as a career, and the period at which the choice is commonly made, the committee would be in a position to outline a well-ordered campaign to bring the right kind of young fellows into forestry, and to steer out of it the obviously unfit. The great problem as I see it is to reach more of the boys while yet in high school, and to induce them not only to take the full collegiate forestry course but also to spend early vacations in actual woods work. A summer or two so spent would double for the right man the value of subsequent school training, and on the other hand would disillusion the lad drawn to forestry solely by the "romantic life" it offers—sometimes. Perhaps the greatest advantage held by the graduate schools is the relatively high proportion of their students who are thoroughly in earnest about their work; the atmosphere is likely to be one of serious endeavor.

"WOODS FORESTERS"

Projecting their inquiry forward, the committee would find the conditions under which forest school graduates subsequently work, and the amount of consciously-planned training they receive in the years of their apprenticeship, factors of enormous importance in their success. What has already been said in criticism of our present haphazard system of "developing" men will serve to indicate the lines of inquiry. Again, consider Kneipp's words of 1918: "The places where their (the technically trained men's) services are needed are of the kinds above described ('in the woods, with headquarters at logging camps, or in the mills with headquarters in the small towns'); the places where they wish to work are the places where modern comforts and conveniences are readily obtained." The committee should make sure whether this is a condition which must continue. If the forester must go to the woods, as we will all grant he must, have we exhausted the possi-

bilities of making the woods livable for him *and his family*? These are the days of good roads, which enable men to live at one point and do a day's work at another many miles distant. The living conditions in logging camp and sawmill town may not be improving as fast as we should like to see them, yet they are indubitably improving. Where camps and towns depend upon public timber, cut only for sustained yield, a well-conceived policy might greatly hasten their improvement. I would have the Society's committee investigate these matters thoroughly. If it were the right kind of a committee it would also face with candor the possibility that in some instances the only feasible solution of the difficulty is to acknowledge that the task of ameliorating woods conditions is hopeless, and to train for the job the type of man whose background will enable him to remain with it contentedly.

SUMMARY

To sum up, an investigation such as I have in mind would give us:

1. The basis for a classification of the American forest schools with respect to faculty and material equipment; such a classification to be the lever wherewith we may eliminate unnecessary and hopelessly inadequate schools, and raise the standards of the remainder.
2. The basis for an intelligent campaign to attract the right type of boy into the schools.
3. The basis for continued development of each graduate forester under the direction of men skilled in capitalizing ability and bolstering up weakness.
4. The basis for an improvement in the living conditions of "woods foresters," or the abandonment of the Procrustean effort to make highly educated men live their lives under conditions tolerable only to men of limited education.

WAYS AND MEANS

That an investigation of this kind would doubtless involve far greater expenditures in time and money than its members could well afford does not detract from the need for it. There are means today of financing such investigations which but a decade or two ago were not in existence. I refer to such bodies as the Carnegie Corporation, which is financing the engineers' investigation; it is but one among several whose aid might be obtained if the foresters were in the habit of thinking of themselves as scientists and entitled to recognition as such.

To some foresters the foregoing recital of our profession's shortcomings will seem absurdly critical, and the need for any such investigation of forestry education as that described too remote to be worthy of consideration. I hope that they will not seem so to the majority.

The profession has had too fine an initial impulse in America, too noble a dedication to the ideals of public service, to be content to stand still, or even less to run the slightest risk of falling behind, in our own or the public's estimation. Ours is a task to challenge any set of men. Those at least in state and federal employ are attempting a program opposed to many of the early traditions of the American commonwealth. We are trying to be *good bureaucrats*, performing as public servants functions which have never before been performed by white men on this continent, and which many of the most influential men of the nation think should be performed, if at all, by private employes. Public forestry in America is a great social experiment, bitterly opposed in the past, and certain to be periodically assailed in the future.

The forester, public or private, is often cast in the role of economic savior of vast areas of sadly harried land, and of discouraged and poverty-stricken populations. Never shall I forget the thought which came to me years ago as I stood in a deserted clearing upon a wind-swept hill in the Southern Appalachians. About me lay as lovely a country as God ever made, but one whose once sturdy native population had dwindled and degenerated under impossible economic conditions, while its torn slopes after every rain seemed to run red with eroded soil, as with its life's blood. Suddenly I realized that my own profession—forestry—might yet be the means of redeeming those splendid hills and gracious valleys to man's use!

Finally—and perhaps this is sheer sentiment, quite unfit to conclude so materialistic a paper as this—we foresters are collaborators with the warm earth in the production of green and living things. Deep in the heart of the earth-born there is an urge not always realized until late in life, if at all, to "make things grow." From the dust whence we sprang we would see other living things emerge. To the forester is given the privilege of answering in direct fashion this mighty impulse.

We are proud of these things. They stamp our profession as one apart from the average, humdrum occupations of life. The price that we pay for membership in it is jealousy of its good name, and determination that those who come after us shall build finer and better than we.

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REALISM IN FORESTRY EDUCATION

By HUGH P. BAKER

After 30 years and more of forestry education in this country it would seem as if the question which is sometimes asked as to what our forest schools are doing for forestry is fully answered by the statement that we have 25 schools or colleges giving professional training to more than a thousand students of college grade. Yet, after more than 25 years as a forester and with the unusual opportunity which the writer has had for study of the schools from within and without, it seems very certain that from the standpoint of the timber owner employing foresters the question as to what our forest schools are doing has not been satisfactorily answered. If the question has not been satisfactorily answered then it is indeed time for the profession of forestry through the Society of American Foresters to take stock of the assets we have in the schools and to determine whether or not these assets are being so handled as to mean a profit to the profession and to the employer of foresters.

The general educational work carried on along forestry lines for the past 25 years by federal and state agencies, educational institutions and individuals, has been a great accomplishment, as difficult as it may be at times to evaluate the results of this work. This educational effort has resulted, beyond a question, in convincing the public that forestry is one of the vital problems before the country, and that forestry can be made the means of re-creating our forests, with all that that means to the public and to the wood-using industries dependent upon the forest for a permanent supply of raw material. The keen interest on the part of the general public in forestry indicates the opportunity and the obligation of the profession to see that trained men who can do the work expected and demanded of them, are supplied by the schools. In other words, specifications have been more or less clearly developed and the question is whether the men coming out of our schools are able to satisfy these specifications in a practical and constructive way.

As the first schools were opened it was a very difficult thing for those in charge to determine just what the character of the curriculum should be. It was a perfectly natural thing to turn to European educational methods and practice for assistance, and even though we have been developing our own practice and literature slowly, our schools and our forest practice have been very greatly influenced by the schools

and the forest practice of Europe and particularly by those of Germany and France. At the time we were leaning most heavily upon Europe it was difficult for us to appreciate that the European countries had gone through years of development and that what we were taking over for our own use was, after all, advanced European development to be used in a rather primitive stage of development over here. We borrowed largely from European silvicultural practice because this practice seemed to apply more directly to our needs while European forest management and utilization were not so applicable. Unfortunately for us, in a way, it would seem as if we had allowed the mold of our curricula to set too quickly around European principles of silviculture, with protection and a little of forest management clinging to the edges of the mold. From our first forest schools men went out into institutions over the country to form forestry departments and schools and, of course, carried with them the ideas as to what should form the curriculum and how teaching should be carried on as developed in the schools from which they came. Ten to twenty years ago, in our aggressive American way, we went after the development of forestry education as the big idea in forestry and it is quite possible that the mold of our educational processes in forestry is now altogether too rigid and too thoroughly fixed or set to allow of the easy introduction of new ideas into the mold. The result of this fixing of the educational mold would seem to be that the schools have become a law unto themselves and that they have set themselves apart in a way that has separated them from forestry in the woods.

Is it fair to judge the work of the forest schools by what is being accomplished in the actual practice of forestry in this country? If not by the graduates who are practising forestry what other standard is there by which a school's value may be determined? If the product is not what it should be, may it not be vital to the future of our profession, that we question and expect an answer as to who owns the schools—from a professional standpoint, of course. Should the schools be owned by themselves to the point of making the teaching of certain subjects the ultimate end, or should the profession own the schools to the end that men may be developed who are willing to practice forestry in the woods and from the ground up? Some of the other great professions of the country, such as engineering, law and medicine, have had to ask themselves the same question as to who owns the schools, professionally, upon which they are depending for the preparation of men for those professions. Many interesting changes are taking place

in our engineering, law and medical schools brought about by the influence of men who are on the firing line of the profession. Is the same true in forestry?

The opportunity in forestry in this country is so great that the profession in a sense faces a crisis. Foresters must make good today if we are to hold our own as a profession and to accomplish what the public and private owner of forest lands has a right to expect from us. Because of the opportunity and the crisis, it is exceedingly important that the profession of forestry, through the Society of American Foresters, should immediately make a thorough study of what is being accomplished in the other great professions of the country in bringing their schools to the point of the highest effectiveness and therefrom developing conclusions and evolving from these conclusions a procedure that will allow our forest schools to meet the challenge with which they are faced. This suggestion is made with no thought of dictation of any sort to the schools, but rather in the belief that it is fundamentally necessary for the schools and for the profession as a whole to face squarely the difficult problem of putting the training of foresters onto a basis that will let us, as a profession, fulfill our obligations and our opportunities to practice forestry in the woods.

It may not be out of place in referring to the tendency towards rigidity and isolation in the schools to make a brief analysis of some of the factors entering into the training of foresters in our schools. The most vital factor is the teacher. Who are the teachers in our forest schools? What is their training and their experience? Are they fully qualified to be real leaders of the thousand eager men who are looking to our profession for a satisfactory life? Have we set our teacher standards high enough or do we have any standards at all? Who, if not the profession itself, should enunciate the standards to be set for the men who are to teach in our schools? From experience and contact it would appear that too many men with an undergraduate degree only and comparatively little experience are serving as teachers of forestry. Is the M. F. degree enough to allow a man to qualify as a first class teacher? No head of a school or even a department in the forest schools of Europe would be allowed to qualify as a full fledged professor without a doctor's degree and then only after extensive practical experience. How many men teaching forestry in the United States have an earned doctor's degree? In our easy going ways in this country and with rapid development, may it not be that the leaders in the profession have been too ready to recommend men to

teaching positions for reasons other than their unusual qualifications as students and leaders? These questions are not put as a criticism but because of their importance in eventually determining the value of our schools and their products. The question of how far the financial condition of a school may influence teacher standards is in a way pertinent. Yet if the profession is determined to maintain proper teacher standards and if there is enthusiastic and scholarly leadership in the schools the question of financial conditions is easily answered as of secondary importance.

Partly because of the newness of the profession and the dearth of men thoroughly trained for teaching, and partly because of the very human tendency among men to surround themselves with men of the same ideas, there has been an excessive amount of inbreeding in the schools. There are several examples of well known schools where promising graduates have been taken in as instructors and gradually advanced until the teaching force is made up almost entirely of the school's own product. An injection of new blood would bring new ideas and greater aggressiveness and would tend to overcome the danger which exists of emphasizing or concentrating on the ideas of the man who developed the school or its present leader. A general exchange of instructors and professors among the forest schools, if such could be brought about, would bring very surprising and very worth while results.

The second most important factor in the success of the forest school is doubtless the development of a sound, well balanced curriculum, worked out on a basis of the needs of forestry in this country. In some of the undergraduate schools there is a very unsatisfactory tendency, from an educational standpoint, towards allowing specialization even as early as the sophomore year. This has come about, doubtless, through the feeling on the part of the undergraduate schools that they should do everything possible to fit their graduates to compete with the men turned out by the post graduate schools. The results of the effort of the undergraduate schools to fit men to compete with graduates of the post graduate schools would seem to indicate that the undergraduate forest school should not attempt to turn out full fledged professional foresters in four years' time. If the effort is made it must be at the sacrifice of thorough grounding in the fundamentals of sound undergraduate training. There has never been a time in the development of forestry in this country when it has been so important as it now is that foresters have at least the fundamentals

of a broad education. From the experience in other professions it seems evident that the time must come and that soon, it is hoped, when the undergraduate school will say to its students that it is giving an all 'round training for the business of life and only enough of applied forestry to make it possible for a man to get the maximum results from a post graduate course, or to start at the beginning in practical forestry work. Short cutting in the training of men for the profession is fair neither to the school nor to its graduates. Our men must have a sound educational foundation if the profession is to be given the recognition which is accorded men trained for the older professions of engineering, medicine, etc. A serious charge is made, all too often, against graduates in forestry by those who have employed them and by scientific men in other lines that the average forester, as he comes out of our undergraduate schools is superficial, too often a stranger to the woods, with a little knowledge of many things and with limited ability to apply himself in a scholarly and effective way.

The restless times in which we are living may be responsible for the attitude of some of the schools and of some of their graduates. Too often the average young forester as he leaves school is unwilling to become a woods forester and to take the years of preliminary training which are fundamental to successful work as a professional forester. All too often, because of the necessity of spending a few years in actually learning the job, the young forester is discontented and turns away into other activities. It would seem sometimes as if the average college graduate of today, and this applies to other schools as well as forest schools, is not satisfied unless he can be married, settled, and in the middle of his professional life at 30.

May it not be a fault, not only in the schools but among professional foresters generally, that we have failed to determine exactly the nature of the service which the forester must give his employer, whether the federal government, the states, or the private owner, before deciding upon the character of the school or the woods training to be given to produce the man who can serve most effectively. In the manufacture of such a commodity as paper, no individual or company builds a mill simply to produce paper without knowing exactly what grade of paper is to be produced and what the market will be. The first decision when considering the building of a paper mill is the kind of paper to be made and the market for it. Often a company will start out with the idea of making a certain grade of paper and after a thorough study of the market will decide that an entirely dif-

ferent grade is the paper in demand and the paper which can be made at a profit. After the right grade of paper is determined upon, then every effort is made to develop the kind of a mill, the building, machinery, the technique and the men needed to produce that particular kind of paper.

In going back over the development of forestry education in this country, it seems almost at times as if we had built our schools to make foresters without determining the kind of a forester we should turn out and the market there will be for the forester when he is ready for service. It is furthest from the idea of the writer to inject the idea of commercialism into the education of the forester but rather to emphasize the necessity for sound and thorough training in the fundamentals and the supplementing of this training by one or more years of post graduate work, or years of practical experience in the woods. After all, the business of our schools generally is to train men for the business of life so that they may have, as the result of the training, a reasonably happy and satisfying opportunity for the practice of their profession.

It may appear that the writer is in a critical mood or that he believes we are badly off the track as we travel into the future of our profession. The real truth is that the writer is a confirmed optimist. He believes in our forest schools and in the men they have turned out. However, after seeing the picture from both sides, that of the schools and then of the need for men who can produce the results desired, it seems very important at this time to stimulate discussion of this most vital phase of our profession—the forest schools. In the friendliest spirit of cooperation we should look the situation squarely in the face to determine accurately just what the problem is and then how we may bring about a satisfactory solution of the problem.

From the standpoint of the profession as a whole, it seems fundamental that we ask ourselves frankly and often the question as to who owns the schools professionally. The schools must carry on in such a way as to keep our profession on the high level which we would all like to see it maintain, that we may stand shoulder to shoulder, and face to face, with trained men in the other great professions who are doing so much for this country in maintaining scholarly professional standards.

THE FOREST SCHOOLS AND THE PRIVATE OWNERS¹

By A. B. RECKNAGEL

Professor of Forest Management and Utilization, Cornell University

The primary function of the forest school is to educate foresters. The forest school is concerned primarily with the giving of a well-rounded training in the fundamental subjects of forestry to those who will, upon graduation, practice their profession, whether in public or private employ.

The fundamental subjects of forestry are silviculture, forest management, forest protection, forest utilization and forest policy. In the training of foresters each of these subjects should receive its proper emphasis. Most forest schools recognize this and have arranged their curricula accordingly. There is, however, a tendency on the part of certain schools to over-emphasize utilization and to subordinate silviculture and management. This is unfortunate because most forest schools are not equipped to turn out logging engineers and, if they were, the field for their employment is relatively limited. Forestry, in its essence, consists of the practice of forest management—that is the application of forestry in the conduct of the forest business—and by training well qualified men in forest management the schools can be most directly helpful to the private owners of timberland.

Consider the case of the private owner. If he is a lumberman, he needs the help of the forester *not* in logging and milling (though he may prove of incidental benefit to his employer) but primarily because the forester knows the art of timber growing and timber management for continuous production. It frequently happens that the forester who enters private employ is sidetracked on some line of more pressing urgency to his employer but he must not fail, in season and out, to show his employer the advantages of forestry and seek every opportunity to put it into practice.

Then there is the timberland owner who is not an operator: he also looks to the forester for technical advice and that graduate forester can serve him best who has received the best training in the fundamentals of forestry.

During the past 14 years many instances have come to my knowledge of students who gave but slight attention to silviculture and man-

¹ Paper read at the annual meeting of the Society of American Foresters, at Philadelphia, Pa., December 29, 1926.

agement while at the forest school and yet found that these were the very subjects they needed most upon entering private employ.

The faculty of the forest schools can be of greatest help to the private owners by performing research work directly useful in solving their problems. The opportunities for such work are numerous and in many schools a helpful cooperation has developed with the owners. It is essential that the results of such research be made available to the public—this by publication and by the activities of extension workers who are making such excellent progress in disseminating and applying important developments in technical forestry. Many faculty members have direct relation with timberland owners whereby they spend their vacations in field work directly contributory to the development of private forestry practice. This relation is mutually helpful to the schools and to the private owners—most of all to the teachers who thereby keep in touch with actualities.

Perhaps the most direct means available to the forest schools for instructing private owners are demonstration forests. Harvard and Yale have done remarkable work in their respective school forests in exemplifying the practice of forestry so that the results may be seen and appreciated by the visitor. Other schools are following this course and it would be difficult to over-emphasize the instructional value of such nuclei in various parts of the country. Field schools for private owners may be developed to advantage in connection with demonstration forests.

The educational process of foresters must never stop with graduation from the forest school. This is particularly true of those men in private employ where the touch with technical progress is less direct than in state and federal work. The schools can help by welcoming graduate students who, strengthened by practical experience, can put in a year of unhampered study and research on whatever problem most appeals to them, at the same time achieving that broadened knowledge of the profession as a whole which graduate study alone can give. The research performed by such students is often a substantial contribution to the profession as a whole.

SUMMARY

How can the forest schools aid in bringing about the practice of forestry on private lands? Primarily by giving to their graduates a

well-rounded training that will enable them to practice their profession most advantageously. The subjects of silviculture and management are the backbone of technical forestry; in a knowledge of these lies the principal service which the forester can render the private owners.

Forest school faculties can help by performing research work of direct applicability to the problems of the private owners. The publication of results and their dissemination by extension workers will be of substantial aid to the private owners.

Demonstration forests under the control of forest schools are a powerful means of instructing private owners in the practice of forestry. Field schools may be developed to advantage.

The further training of men in private employ, particularly by graduate study after adequate experience, will make them more capable of dealing with the problems of the timberland owners while enriching the profession by the results of their research studies.

PROBLEMS IN FOREST EDUCATION

REPORT OF COMMITTEE ON FOREST EDUCATION

During the past year the Committee on Forest Education has had subcommittees at work on the following subjects: Graduate Work in Forestry, Training of Specialists in Forest Products, Vocational Training in Forestry, Non-Professional Courses and Extension Work, Forest Research in Educational Institutions, and Field of Public Service in Forestry by Educational Institutions.

In organizing these subcommittees I prepared rather extensive outlines suggestive of the field to be covered. All of the subcommittees have been doing considerable work and all but one have sent reports to the chairman. These reports are so replete with valuable information that a brief summary presented at this time would not do them justice and it is my recommendation that they be published some time during the year in the Journal. In fact I am wondering whether it would not be a good plan to devote one issue of the Journal to a symposium on forestry education, in which these reports as well as a number of additional articles might be included. I believe that the employers of the graduates of the forest schools are keenly interested in the type of training these men are getting and that such a symposium would be received with a good deal of interest.

Professor Dubuar asks us to consider his report as merely preliminary and would like to have the personnel of this subcommittee continued through another year. Your chairman is not sure whether the other subcommittees feel that their work has been completed and although the reports received have covered the respective subjects quite thoroughly I believe that changing conditions and a further consideration of some of the items studied will reveal additional points of value. Therefore, unless the chairmen of these committees feel that their work has been fully completed I would recommend that these committees also be continued.

On account of the large amount of extra curriculum work which I have had during the past year and which I expect will continue during the next two years I beg at this time to tender my resignation as chairman of the general Educational Committee.

I want to take this opportunity to thank the chairmen of the various subcommittees for the painstaking work they have done, and the president of the Society for the interest he has shown in the work of this committee.

HUGO WINKENWERDER, *Chairman.*

GRADUATE WORK IN FORESTRY

This subcommittee started work late in the winter of 1926. Since the members were scattered, the work has been carried on mainly through correspondence.

As a first step the subcommittee formulated their own ideas as to what should be included under the term graduate work in forestry. After some correspondence the following statement was approved by the members of the subcommittee:

For the purposes of the subcommittee on "Graduate Work in Forestry" it is accepted that:

1. A man must have at least the minimum number of credits ¹ in one of the major fields of forestry before he can be considered as taking graduate work in that field. This rule applies even though the man may already hold a bachelor's degree.
2. The term "Graduate Work in Forestry" is taken to mean additional work in at least one field of forestry beyond the minimum in that field accepted as desirable for a member of the profession.
3. Graduate work in forestry may include regular course work, special courses, individual work of advanced character, seminars and research. The work of each student should include some individual work or research. It may lead to either the degrees of F.E., M.F., M.S., D.S., or Ph.D.

Rule No. 1 is intended to discourage the classification as graduate students in forestry, *a* of men holding a B.A. or B.S. degree who are now taking their first or second year of forestry work and *b* of men registered in schools giving an undergraduate course in forestry below the standards set in "Education in Forestry," ¹ who might be carrying advanced work or special problems.

Letters were written to the colleges in the United States and Canada known to be giving forestry work asking whether they gave graduate work in forestry. Answers were received from 28 schools.

The following schools stated that they did not give graduate work in forestry:

Mont Alto, Pennsylvania
University of British Columbia

¹ As a standard for determining in a general way the minimum number of credits the reports of the committee on the undergraduate course leading to the degree of bachelor of science in forestry may be taken. See "Education in Forestry," Bulletin 1921, No. 44, Bureau of Education, U. S. Department of the Interior, 1922.

Colorado Agricultural College
Colorado College
Connecticut Agricultural College
Louisiana State University
University of Main
Pennsylvania State College
University of Maine
State College of Washington

Eighteen schools reported that they did give graduate work. They are listed below:

Cornell University
University of California
Georgia State College
Harvard Forest
Iowa State College
University of Idaho
Michigan State College
University of Michigan
New York State College of Forestry
University of New Brunswick
University of New Hampshire
University of Minnesota
University of Montana
Oregon State College
Purdue University
University of Toronto
University of Washington
Yale University

A questionnaire was then prepared and sent to each school giving graduate work in forestry. In connection with this questionnaire forms for reports from individual members of the faculties were also sent out. To date reports have been received from 16 out of the 18 schools giving graduate work in forestry and from 63 out of an estimated number of 80 to 85 teachers in the schools. Since many of the men on the faculties have been absent on sabbatical leave or vacations this percentage of approximately 75 per cent is considered satisfactory. The reports presumably apply to the school year 1925-26.

The following statistics and comments have been secured from an analysis of these reports submitted by the schools and their faculties.

The total number of students taking work in forestry at the 16 reporting schools is 1,495, of these 71 or 4.7 per cent are engaged in

graduate work.² These men are registered at 13 schools. The 71 graduate students are divided as follows:

Taking their first year of graduate work	55
Taking their second year of graduate work	12
Taking their third year of graduate work	2
During their sixth year of graduate work	2

Of the 16 students listed as taking their second, third or sixth year of graduate work—approximately half are working for the doctorate and half for master's degree. The two men taking their sixth year are working for Ph. D. degrees and are teaching part time and spreading the work which might be concentrated within three years over six or more years. Several others working either for the master's or doctor's degrees appear to be pursuing a similar course. In only three instances did it appear that more than one full year of work was being pursued by graduate students in work for the master's degree. In two of these cases the extra year apparently was necessary to remedy deficiencies in undergraduate training. It is doubtful whether many men take more than one full year of graduate work in forestry. Those who do usually are working for Ph. D. degrees.

The general requirements for admission to graduate work in forestry are quite uniform among the different forestry schools. They require a Bachelor's degree in forestry for admission to graduate work. This degree may be either B. S. F. or a baccalaureate degree in arts or science. In the latter case the student must have completed the usual forestry courses included in an undergraduate forestry curriculum. At least one school allows professional experience to be substituted for the Bachelor's degree.

In view of the uniformity of practice as to the general requirements for admission it seems unnecessary to go into details as to the individual forestry courses required for admission to graduate work. A question of this character was asked on the questionnaire sent out in order to bring out the minimum amount of forestry which was accepted as a basis for graduate work in forestry. Evidently the point simmers down to a discussion of what is required in the regular undergraduate forestry course at different schools. This is out of the field of this subcommittee's work.

² It is estimated that the total attendance at all forestry schools in the United States and Canada is approximately 2,000 with 3¾ per cent of the students engaged in graduate work.

The requirements for admission to graduate work in forestry are approximately the same as for graduate work in other professional schools. Some of the reporting institutions stated that the requirements compare "favorably" with those of other professional schools. As compared to certain of the more highly specialized professions such as law and medicine the requirements are undoubtedly not so great. The forester secures much of his professional training, indeed all of it, in many cases, during his undergraduate college course, whereas in the highest type of medical and law schools the professional training, though still undergraduate in character, comes entirely after a Bachelor's degree (B. A. or B. S.) has been received. Graduate work, when pursued by the young lawyer or doctor, comes as a third phase of his education.

Graduate work in forestry as at present given is made up of research, advanced courses, courses in subjects allied to forestry and to a limited extent elementary courses in forestry. Most schools apparently emphasize research as a field which should occupy a major part of the graduate student's time. In nearly every school courses intended for graduate students are listed.

The distribution, by subjects studied, of the graduate students in forestry is shown below. Evidently there is a wide dispersal of interests. Sixty-one per cent of the students are specializing in four branches, namely, silviculture, management, wood technology and utilization.

Subject	Percentage of total number of graduate students
Dendrology	3
Ecology	2
Entomology	4
Forest chemistry.....	3
Pathology	8
Soils	2
Silviculture	24
Management	14
Mensuration	4
Logging Engineering.....	4
Range Management.....	4
Recreation	3
Taxation	2
Utilization	11
Wood Technology	12
Total	<hr/> 100

Fifty-eight per cent of the graduate students are studying at the same institutions at which they took their undergraduate forestry. The remaining 42 per cent of the graduate students have changed to new schools for their graduate work.

Figures submitted by the schools show that of the graduate work in forestry actually elected approximately 51 per cent is research, 28 per cent advanced study, 13 per cent consists of elementary courses in forestry and 8 per cent study in basic sciences or subjects closely related to forestry.

The records of the work actually elected indicate as shown above that approximately half the time is given to something besides research. Evidently the graduate students find the need of taking certain elementary courses in forestry and elect a small amount of study in basic sciences or subjects closely related to forestry. Where a student in taking graduate work changes his school, he often finds it advantageous to repeat under new instructors the elementary courses in forestry in which he is especially interested.

Degrees given to graduate students in forestry are of two types—Master's degrees and Doctor's degrees. The degrees of M. F., M. S. F., M. S., M. A. and M. C. F.³ are granted by one or more schools. The first three are those most commonly given. Only six out of the 16 schools reporting state that Doctor's degrees are granted to graduate students in forestry. It is fair to assume that when the demand arises a Doctor's degree could be secured in most if not all of the other schools giving graduate work in forestry. In one case the degree granted is Doctor of Science, in all others it is Doctor of Philosophy.

In nearly all cases the Doctor's degree is granted by the graduate school rather than by the school or department of forestry and is granted only where the student majors in some branch of pure science.

For the Master's degree one year at least of residence work is required. For the Ph. D. degree ordinarily three years are required although in exceptional cases it may be possible in some schools to secure the degree through one year of residence accompanied by two years' work elsewhere.

A question was asked as to the facilities in the way of physical equipment and other facilities for graduate work in forestry. This question the schools failed to answer in a complete manner. One reason for this failure may be due to the fact that in the catalogues of the different schools a description of such facilities ordinarily is given. Two

³ Master of City Forestry.

schools each report \$6,000 a year set aside in their budgets for research. This is exclusive of salaries of the permanent faculty engaged partly or wholly in research and is the maximum amount reported.

Unquestionably some schools are able to furnish better opportunities for graduate work of one character, while other schools may be able to excel in another line. The subcommittee feels that it would be too much like advertising individual schools to attempt to bring out in this report the special facilities and opportunities which individual schools may have for graduate work in forestry. A prospective student can secure catalogues and should be able to make his own decision as to the institution which offers work best suited to his needs.

The returns from the individual teachers shed some light on the situation as regards faculties. Sixty-three men reported—of these 18 per cent hold only Bachelor's degrees, 68 per cent hold Master's degrees, 14 per cent hold Doctor's degrees. All of the nine holders of Ph.D. degrees are teaching in the field of basic sciences, namely, botany, chemistry, entomology, pathology and zoology. A possible one exception would be of a man specializing in grazing. He, however, may well be thrown under the head of botany.

When the teachers are divided on the basis of experience the results are as follows:

- 10% have from 1 to 5 years experience.
- 15% have from 6 to 10 years experience.
- 22% have from 11 to 15 years experience.
- 28% have from 16 to 20 years experience.
- 15% have from 21 to 25 years experience.
- 5% have from 26 to 30 years experience.
- 2% have from 31 to 35 years experience.
- 3% Unclassified.

100% Total

Experience in lines other than teaching is included. In the majority of cases the teaching experience is longer than experience in other lines.

A man to be a good teacher of graduate students should himself be engaged in research or have published results of such work to his credit. In order to bring out the facts in regard to the productiveness of the teachers they were asked to give a list of their publications which involved original research. The returns are extremely difficult to evaluate in a comparative way. Between individuals there is a wide range from

no published work to many important contributions. This is a quite natural situation since the time available for research is extremely variable. Furthermore not all teachers are adapted for such work. On the whole it is believed that teachers have made and are making important contributions of original character.

An estimate as to the division of time of the teachers was attempted. They were asked to divide their time between four projects. The returns when averaged gave the following results:

Time allotted to teaching graduate students.....	10%
Time allotted to teaching undergraduate students.....	42%
Time allotted to administrative and other general duties	17%
Time allotted to research	19%
Time allotted to contacts with practical work.....	12%
<hr/>	
Total	100%

The total range among individuals was from 0 to 76 per cent of their time given to research.

When the teachers are classified on the basis of those giving 25 per cent or less to research and those giving over 25 per cent it is found that 81 per cent of the teachers fall into the former class, while only 19 per cent of the teachers give more than one-fourth of their time to research.

A SUMMARY OF COMMENTS BY THE SUBCOMMITTEE

We feel that the function of this subcommittee is to ascertain and present the present status of graduate work in forestry. The study is a preliminary and not an exhaustive one.

It seems unwise to make any comparisons between individual schools. Emphasis instead is placed on an attempt to formulate the essentials for satisfactory graduate work in forestry.

a. Graduate work in forestry is likely to be of one year duration leading to the Master's degree. To a smaller extent work extending over three years and leading to a Ph. D. degree is justified. Where this is done a student should major in pure science on a problem having a close relation to forestry.

b. Requirements for admission to graduate work should be:—possession of a Bachelor's degree in forestry or else of a Bachelor's degree not in forestry and credit for the elementary courses in such branches of forestry as are embraced in the graduate work to be pursued. Such Bachelor's degrees in forestry to be accepted as a basis

for graduate work should be from a school giving an undergraduate course in forestry equal to the standard set by the Society of American Foresters and outlined in "Education in Forestry," Bulletin No. 44, Bureau of Education, U. S. Department of the Interior, 1922.

c. In general the requirements for graduate work in forestry are the same as in other professions yet on the whole less is required in forestry as compared to the best schools in the older professions, such as law and medicine. This is to be expected and quite proper. The professional *undergraduate* training in forestry is less than in some of the other professions and it is quite logical that the length and severity of the graduate work should be less.

d. The faculty in a school offering graduate work in forestry should contain an adequate percentage of experienced men. The individual members of such a faculty should have some time allotted in which they may themselves undertake research. Men from whom graduate teaching is expected should be specialists in some one line of forestry and should not be asked to teach a variety of subjects. It can be shown that in some institutions the proportion of students to teachers is higher in forestry than in most other departments.⁴ Such a situation is likely to prevent systematic research. It can be met by increasing the staff, decreasing the teaching load and thus giving more time to each of the staff for research. Until this is done the development of worthwhile graduate work in such a school is not to be expected. The individual members of the faculty have opportunity through use of sabbatical leave to increase their experience and teaching efficiency and to undertake research.

e. The most successful undergraduate teachers are not necessarily the best teachers of graduate students and vice versa. This points to a division of the staff within a school into graduate and undergraduate teachers. Whether the time is ripe for a sufficient enlargement of the staff to make such a division possible must be settled individually by each institution. Unless the staff can be enlarged it may be better for certain schools to specialize on undergraduate instruction. This opens up an interesting field for discussion. It may be argued that it is a good thing on the whole to have a small amount at least of graduate work in progress in each school. On the other hand if this work really is to be what the name implies it must be given by men suited to the work

⁴ This phase of the subject was not investigated thoroughly by the sub-committee. It may be worth while to do so.

and not overburdened by undergraduate teaching. Otherwise the reputation of the school may suffer.

f. Graduate work in forestry should be centered either around research problems or around advanced study within a special field. Other things are good, such for example, as advanced courses in subjects already covered. This brings contact with new instructors and furnishes a stimulus in this way. Time may be given to basic sciences where these bear on the student's research. The taking of elementary courses in the basic sciences and of elementary courses in forestry indicates an inherent weakness in the graduate student's undergraduate training.

g. Students will profit most from their graduate work by going for such work to a school other than the one where the undergraduate work was taken. The change in viewpoint has a broadening effect upon the student. He is more likely to carry on serious work when removed from the field of his undergraduate associations.

h. The facilities needed by a school giving graduate work in forestry are as follows:

A library—this can not be too rich. Its absence is a serious handicap to real graduate work.

Apparatus for experimentation in the subjects in which specialization is undertaken.

Laboratories and tracts for field work.

Means for obtaining contacts with various industries.

A budget adequate to finance the amount of graduate work undertaken.

Most important of all is the human element. No combination of physical equipment and other facilities can outweigh the value of a proper relationship of student and teacher. There must be on the one hand students with the capacity and desire to learn and on the other the teacher with ability to teach and to direct the investigations of the student.

i. Less than four per cent of the men studying forestry are taking graduate work. Is this a large enough percentage? If not is it practicable to measurably increase this percentage? How large a supply of students capable of carrying on and profiting by graduate work will be available? Is the teaching staff competent to handle a largely increased body of graduate students? If more extended training in forestry is needed today, should it be secured by the expansion of undergraduate training (thus making forestry more nearly comparable to

law and medicine), or by turning a larger body of men into graduate work?

These are questions, among others, which have been brought up by this brief investigation and which merit consideration.

Subcommittee on Graduate Work in Forestry

R. C. HAWLEY,
JOHN BENTLEY, JR.
HENRY SCHMITZ

RESEARCH IN FOREST SCHOOLS

In view of the careful and exhaustive survey now being conducted by the National Academy of Science, it was with some hesitation that your Subcommittee on Research in Forest Schools undertook to prepare a report at all. Under the circumstances it seemed best to confine our inquiries to certain leading questions rather than to resort to an elaborate questionnaire.

The heads of 17 schools of forestry were asked for information on the following five items, with the request that additional comment tending to define the status of investigative work would be welcome.

1. The conditions peculiar to your region and tending to indicate what are the most urgent problems.

2. The plans in operation for correlating research work with the regular curriculum and with local agencies.

3. Advantages, if any, gained through cooperation upon the same problems between forest schools of the same region.

4. The extent to which the research program of the forest school should be distinct from the program of all other agencies in the same region.

5. What administrative arrangements, allowance of time to instructors, for example, does your school make to promote research? What funds do you have exclusively for research work?

Fourteen of the institutions circularized returned answers, most of them fairly complete and some unusually full and significant. Of those reporting, every one considers research an important, if not a major, activity. At several of the older or larger institutions at least half the available resources, both in funds and personnel, are devoted to it. In one case investigative work is the exclusive object. In fact, the extent to which research, both as a factor in the curriculum and as an independent function, has permeated the schools is the most striking feature of the present canvass. So far as can be judged on paper, most

of the projects being undertaken are useful and significant. They appear to have been chosen in the main because of primary or peculiar importance to the region in question. There is a preponderance of problems in applied forestry, or forest economics, rather than in the basic sciences. From the standpoint of promotion there is developing in several regions a fruitful combination between the schools and the beneficiaries of research, such as associations of manufacturers or timberland owners, lumber companies and semi-public agencies. The latter furnish help both in the form of money and suggestions for study, which greatly facilitate possible accomplishment. Direct cooperation on particular projects between two or more schools does not seem to be widely in operation, and while approved by some in theory is questioned by others as impractical. In most schools where instruction is upon a graduate basis, a problem of research is a part of the work of every student, but there is great diversity of method in the relation of such problems to the curriculum in general. The amount of money and other resources which the schools devote to research is difficult to state exactly. It appears, however, that among all the schools approximately \$75,000 is appropriated directly for research and that at least half as much more, while nominally allotted to instruction or equipment is really applied to the same purpose.

Any attempt to appraise the value of so many and varied investigative programs must under the circumstances be tentative and perhaps superficial. Nevertheless the character of the questions asked and of the replies thereto seems to indicate several definite tendencies.

1. Inadequacy of the Usual Training for Research Men.

If there is a general weakness in forest school research, it lies apparently in the inadequate or inappropriate training which has hitherto been available and which is responsible for the impression that the research of foresters has been, by comparison with other engineering and biological sciences, superficial. The head of one forest school characterized the average published result of research as "thin." Few forest school graduates have both the sound college training and the special knowledge which are required for work of a fundamental character. The difficulty is at bottom one of education, and it is not the province of this committee to pass upon the character of forest education as a whole. It is safe to say that if we have men more soundly trained both in special technical knowledge and in the education that lies behind it, we shall automatically secure more significant and convincing production in research.

2. Organization of Research is Overemphasized.

Another feature which is conspicuous in present research policy is the apparently greater consciousness of the promotion and organization than of the actual problems and substance of the work itself. On every hand, there are plans being urged and formulated for the correlation and co-ordination of research. It is the opinion of this committee, which is shared by the heads of several schools, that we are in danger of losing the product in an over-development of the machinery, of mistaking the form for the substance. There is ample opportunity for exchange of ideas and information in the agencies already at work in the several regions. In at least four regions the Forest Service experiment stations have developed an informal but nevertheless effective liaison with the local forest schools that promises to serve every purpose of mutual help and stimulus, even to the point of direct cooperation on particular projects. Beyond a certain point the attempt to organize comprehensively so individual a function as scientific research is a nuisance rather than a help. The advance of knowledge is not promoted so much by standardizing methods and students as it is by encouraging and letting alone those who have the flair for discovery. The machinery of existing organizations should be sufficient for the coordination of research programs.

3. Fundamental Research Needs Development.

It seems to be quite generally felt that forestry is in particular need of more exact knowledge in the fundamental physical and biological sciences. Probably this is another way of saying that the profession hitherto has been concerned, perhaps necessarily, with propaganda and promotion rather more than with the technical basis of practice. The defect in our research policy may also be ascribed to the character of forest education which, in turn, has been perhaps unduly influenced by ideals of practical and business expedience. Thus the shortcomings of research in forest schools are doubtless unavoidable by-products of the general economic status of forestry. It appears now, however, that we have reached a point where more fundamental investigations are necessary, and we must look to the schools to provide competent men and a considerable portion of the leadership.

In submitting this general survey of forest school research, the Committee believes that for the present no special action by the Society should be recommended, at least until the committee of the National

Academy of Science has made further progress in the study of the whole problem of education and research.

Subcommittee on Research in Forest Schools,
R. T. FISHER, *Chairman.*

COMMENTS

By D. S. JEFFERS
Iowa State College

Reference is made to the subcommittee report on "Research in Forest Schools," submitted by Professor Fisher, Chairman. He has suggested that I communicate directly with you concerning any part of the report, if I wish to make any suggestions or amendments. Professor Fisher has been courteous in incorporating suggestions previously made with reference to the work on this committee, and the suggestions which I now make are not in a nature of any criticism, but rather personal opinions regarding the work of the committee.

I was very much impressed by the returns of the forest schools as summarized in Professor Fisher's report because some of these points form the basis for what I would add to the report. May I be permitted to call them to your attention specifically?

"Everyone considers research an important, if not a major activity. At several of the older or larger institutions at least half the available resources, both in funds and personnel, are devoted to it. * * * The extent to which research, * * * has permeated the schools is the most striking feature of the present canvass."

"Beyond a certain point the attempt to organize comprehensively so individual a function as scientific research is a nuisance rather than a help."

That "certain point" I assume to be the * * * "encouraging and letting alone those who have the flair for discovery."

If "the shortcomings of research in forest schools are doubtless unavoidable by-products of the general economic status of forestry," and if, "we have reached a point" (and I believe we have), "where more fundamental investigations are necessary, and we must look to the schools to provide competent men and a considerable portion of the leadership," then there is distinctly a problem for such a committee as we have in the Society at the present time.

I would suggest a change in the conclusion of the report that there is "for the present no special action by the Society to be recommended."

About one year ago the chairman of the committee, Professor Fisher, endeavored to secure cooperation with a committee of the Academy of Science in its study of research. This he was unable to do, and at that time thought we should drop the work of the committee. At that time I had much the same opinion I have at present, namely, that there is room for a committee of this sort. Dean Henry S. Graves, a member of the Academy of Science committee which is charged with the investigation of research under the general education board, says, "There is, however, special need of the investigation of the sciences underlying forestry, with special reference to problems in the field of forestry. The national academy is particularly interested in these fundamental problems." If I read that quotation correctly I understand that the Academy of Science is not so much concerned with forestry at the forest schools and research at these schools as it is with the fundamental sciences so essential to research in forestry. Dean Graves suggests that there is "a considerable amount of research now under way at the various stations in the United States Forest Service, at the forest schools, and by various other agencies."

Although I believe I can agree with the feeling of Professor Fisher, that we may have some hesitation in conducting an investigation of research "in view of the careful and exhaustive survey now being conducted by the National Academy of Science, yet," it seems to me it may well be within the limit of probability that a committee of the Society might develop a line of work for research quite distinct from that of the Academy of Science.

Whatever the findings of the committee of the Academy of Science may be, the Society of American Foresters can not hope to depend upon the Academy to assume all of the responsibilities for the forestry problems in research which may arise.

The question has been raised,

"Who will lead forest research?" (Journal of Forestry, Vol. 24, May, 1926.)

The writer of the above article suggests:

"Forestry, therefore, offers a distinct field not only for the application of scientific results worked out by specialists in other fields, but for building a science peculiarly characteristic of forestry alone."

"Without foresters taking a hand in the solution of the fundamental forest problems there is no hope that they will be solved by any scientist any more than a bacteriologist, physicist, chemist, and X-ray

specialists can alone solve the problems of medicine. These scientists can help but alone they can not build a science of forestry."

The membership of the Society of American Foresters is very largely composed of men of the forest schools "to which we must look for competent men and leadership." Therefore, it seems to me that we have a very vital connection with the forest schools which enables the Society to be of considerable value in suggesting ways and means, not only of preparing and selecting men for research, but of conducting research. If the published results of research are "thin," is it the fault of the investigator, the school, or the editor of the publication? Upon this point the Society can very well express its opinion and do a very great deal in solving what is one of the important problems of our profession.

Granting, "It is not the province of the committee to pass upon the character of forest education as a whole," yet, it may be well within its province to express for the Society some standards of training and experience which it is generally agreed should prepare a man for research in forestry. This borders very closely upon the field of the Academy of Science Committee.

Therefore, I would recommend the continuance of a subcommittee on forestry research another year. I think the committee can well be charged with the responsibility of gathering information of a general or specific nature as the Society may wish, along the lines already opened up and further along the following lines:

1. Requirements of training and experience for candidates before being admitted to the field of research.
2. Difficulty encountered at the various schools in advancing forest research and choosing of satisfactory research men.
3. Methods of research successfully carried out in various forest schools, along technical lines.

In making these suggestions I am not unmindful of the fact that we may be working rather blindly and that some of our work may be duplicating that of a committee better prepared in many ways, in fact, in all ways, than our committee may be, namely, the committee of the Academy of Science. However, I am mindful of the fact that other Societies comparable with the Society of American Foresters have been conducting investigations for years along the lines of investigation and research in their profession. Considerable time and attention have been given to the matter of English requirements in the profession of Engineering. From my own experience and observation, I believe that one

subject is of considerable importance with reference to the training that should be required of the candidates for research. Undoubtedly the field is broad, and if the Society does not choose to limit the field, then continue the committee and instruct it to find the field where it can best exert its influence for the profession in the field of research. I do believe that it is very important that we should do so.

VOCATIONAL EDUCATION IN FORESTRY

Someone has said that forestry education has placed too much emphasis on the training of "commissioned officers," and not enough on the training of "sergeants," "corporals" and "privates." There is a good bit of truth in the observation. In Europe, if a comparison with conditions there is worth anything, the number of men prepared for subordinate positions is greatly in excess of the number of technical foresters. Since forestry education there is largely in the hands of the governments and men are turned out in the numbers and proportions needed it is reasonable to suppose that the ratio of technical foresters to those who have received a vocational education in forestry in this country is not just right.

There may be a question in the minds of many foresters as to the immediate necessity of secondary training in this country. One may cite, for instance, the Forest Service which has lately been able to fill many ranger positions from the list of those eligible for junior forester appointments. It is likely that some such condition is duplicated in the case of other organizations offering positions which require a knowledge of forestry. However, there is no reason to believe that such a state of affairs is an indication of a lack of opportunity for men with a vocational training. In the case of the Forest Service, four-year graduates are willing to take the ranger positions because of the increased responsibility, salary and opportunity which they offer. The ranger, in many respects, must be as capable as the supervisor of fifteen years ago. It can not be said that secondary forestry education is sufficient training for such a position. But, if the ranger's training must be more complete, by the same token, the members of the force on his district must be increased in number and responsibility. The time is at hand when the unschooled field man will not fill the bill. To sum it up, the day of the untrained man even in subordinate positions is passing, the four-year graduates will aim at something higher and so a real opportunity is at hand for the man with vocational training in forestry.

Experience to the present time points to the fact that young men who are given properly balanced training for not over one school year can handle many duties in the field in first class shape. In addition they have a much better outlook toward their job as they have some idea of the manner in which it fits in with the other activities being carried on by their organization.

The subcommittee is of the opinion that foresters and those who employ them do not realize the extent to which vocational forestry training helps the man in the field. He can do timber survey work, understands enough of silviculture to mark timber or make thinnings, can better carry out his part in any plan for forest protection or improvement work and at some of the jobs connected with forest utilization he is a decided improvement over an untrained man. Since there are certain kinds of work in the field which he is perfectly competent to do the obvious thing is to place him in the positions for which his training has fitted him so that the technical man is left free to take care of work requiring a higher degree of skill or better judgment.

A number of forestry schools are now giving so-called Ranger Courses and some are offering short courses of not over two or three weeks' duration on dry kiln work, portable saw-milling and tree pruning. Also, lumber manufacturers are working on a definite policy of training men for positions of responsibility by putting them through a few years of apprenticeship during which time they work on jobs of a subordinate nature and become familiar with the manufacture of lumber in the mill and its seasoning and handling in the kiln and the yards. The Forest Service endeavors to improve its own organization by giving some training to guards and rangers. Below is a more detailed description of the vocational courses offered by the schools and other organizations.

1. The Forest Service to increase the efficiency of its field force holds guard schools on many forests just before the opening of the field season. At these schools, which are of short duration, the field force is instructed in the duties which they will be called on to perform. In addition to the guard schools there is the opportunity in some districts of taking correspondence courses which are handled from the district office. These courses cover all branches of forestry at least in part and many Forest Service men, particularly rangers, have been greatly benefited by them. That the Forest Service has undertaken such work is the proof that too great a gap exists between the untrained woodsman and the technical forester.

2. Many lumber outfits now train their salesmen and also men for other positions of responsibility by placing them on one job after another in the mill, dry kiln and yards so that they become familiar with the entire process of manufacture. The training is in the nature of an apprenticeship and there is no doubt that it means better utilization. Lumber salesmen trained after this fashion really know the species and grades which they have to sell.

3. Logging outfits and sawmill men in the Inland Empire signified a desire at a meeting at Spokane on June 4, 1925, to arrange for vocational training to prepare men for all of the jobs in the woods and mills which require mechanical skill. If the plan carries through it will mean more efficient logging and milling practice.

4. A number of forestry schools offer short courses in dry kiln practice, portable sawmilling, lumber grading, log scaling and tree pruning for employees of public utility outfits.

5. Western forestry schools in close touch with the Forest Service have offered Ranger Courses in the winter season for a number of years. These courses are primarily for the field man who has never had the opportunity of acquiring any technical knowledge. No great emphasis is given to field work since the majority of those who attend have already had more or less experience in the field. A great many guards and rangers have attended these courses and have found them of great benefit.

6. A Ranger Course of the length of one school year is given in the East. This course is evenly balanced between the field and classroom so that young men without previous forestry training or field experience become competent to handle many of the field duties which fall to the lot of the forester.

The subcommittee would like it understood that this report is in the nature of a preliminary report and that it would like the personnel to remain unchanged for another year. A portion of the information on which a final report is to be based is not yet at hand though it was asked for sometime ago.

In the meantime there are a few suggestions which the subcommittee desires to make.

1. That those who have received vocational or secondary training in forestry be hired for the positions for which their training has fitted them. They are obviously better fitted than the untrained man and the four-year graduate is capable of handling more responsible work without serving any great length of time in the lower positions.

2. That the practice of lumber manufacturers in training men for positions in their own organizations be commended since it means more efficient manufacturing methods and better utilization.

3. That forestry schools, especially in regions where no vocational courses in forestry are offered, give serious consideration to establishing such courses. The conditions in the various forest regions vary so greatly that a man receiving secondary forestry training in one locality is not immediately fitted for work where conditions are materially different.

Subcommittee on Vocational Education in Forestry,
JAMES F. DUBNER, *Chairman.*

EDUCATION IN FOREST PRODUCTS

Your committee has made a careful study of the training of specialists in forest products in various American forestry schools. Twenty years ago men who were especially trained for work in utilization were not regarded by some as foresters. It is now generally agreed that utilization is a very important part of forestry and constitutes a phase which interests timber owners, lumber manufacturers, and wood-using industries because of its immediate application. Men are now being trained for work in dry kiln engineering, logging engineering, pulp and paper manufacture, timber preservation, or wood seasoning, merchandising and research specialists, etc. If these men are helping to save what would otherwise be waste or are aiding in the efficient use of wood, they are helping in the conservation of our forests in just as practical a way as planting more trees or in silvicultural thinnings. This principle has been recognized and accepted but it has not been directly applied in all of our forest schools because of lack of facilities, available appropriations or direct need.

It is not believed that all of the schools should indulge in the training of men for these and other specialties. Emphasis should be given to those phases of utilization where there are opportunities for men to contribute in a helpful way to meeting the local or regional problems. For example, logging engineering is a phase of the subject that has particular application in the big forests of the Northwest. On the other hand, pulp and paper manufacture is centralized largely in the Northeast and the kiln drying of lumber is practiced mostly in great wood using plants such as automobile body factories, furniture plants, etc., of the East and Central West.

Whereas a few years ago relatively few graduates of our forest schools went into these phases of forestry, recent figures show that the forestry schools are showing a marked departure from the former fields of employment into utilization. Figures compiled from some of the forest schools in the fall of 1926 disclose the fact that of all the graduates of the respective schools the following are now in some phase of utilization:

University of Montana.....	14%
University of Minnesota.....	37%
Iowa State College.....	27%
University of California.....	23%
Yale Forest School.....	10%
Oregon Agricultural College.....	39%
New York State College of Forestry.....	29%

The fact that so large a percentage of forest school men who have not had special training in utilization are finding work in competition with engineers, signifies the possibility of men who are properly trained for this special work.

Regarding remuneration, it is believed that financial rewards are more promising in this than in any other phase of forestry. This has been demonstrated in a number of notable examples. These men are really contributing in a very positive as well as immediate way to the solution of many of the problems in forestry. Forest school graduates who rise to an executive position of responsibility in lumber companies or with timber land owners are often in a position to help the cause of forestry and often do. We can not have too many men working for the solution of our forestry problems, whether in utilization or other phases of forestry.

Regarding the nature of the training, there is a great divergence of opinion among members of the committee. Some feel that mechanical engineering should be stressed, others that chemical training should be strengthened, whereas still others feel that fundamentals such as mathematics and physics as well as biological sciences should be emphasized. It is patent that it is impossible to thoroughly ground a so-called utilization engineer in both physics and chemistry. Furthermore, it is by all means desirable that one intending to specialize in any utilization phase of forestry should plan to put in from five to six years or more in training for this work. However we may regard the training as incomplete or unfinished, the great body of college

men in this country feel that four years is sufficient for a life training, and even though the five or six-year training is emphasized, a large proportion of them will go out into their life work on the completion of the undergraduate curriculum. With this in mind, the curriculum should be devised and predicted on the theory that the men should take five or six years but if they can only take four they will at least have had many of the fundamentals and an application of some of these fundamentals in the direction of various utilization specialties.

The following is a general outline of courses desired in utilization training:

- I. Fundamental sciences.
- II. Brief course in:
 1. Silviculture.
 2. Management.
 3. Dendrology.
 4. Entomology.
 5. Mensuration.
 6. Engineering.
 7. Pathology.
- III. Full courses in:
 1. Properties.
 2. Uses.
 3. Seasoning.
 4. Timber Physics.
 5. Grading.
 6. Logging.
 7. Lumber Manufacture.
 8. Products.
 9. Forest Economics.
- IV. Engineering (mechanical):
 1. Machine Design.
 2. Shop Practice.
 3. Factory Management.
 4. Factory Operation.
 5. Time Studies.
- V. General Courses:
 1. Cost Accounting.
 2. Economics.
 3. Business Law.
 4. Rhetoric.

VI. Two full summers of practical work in:

1. Mills.
2. Yards.
3. Factories.

It is felt that the fundamentals as now given the first two years in most forest schools are very near the theoretical ideal. To be a good forest products engineer, one should have an appreciation and understanding of such courses as forest management, silviculture, cruising and surveying. In other words, we believe that the utilization specialists should know something about silviculture and conversely, the silvicultural specialist should know something about utilization. If this is done there will be a more sympathetic understanding by each of the broad phases of forestry and its problems.

We do not believe in too narrow a training nor too strong emphasis on utilization phases of forestry while in college. The fundamentals should be stressed and as much direction given to an understanding of the fundamental principles of utilization as possible without too much emphasis on statistical or "fact" courses.

There is appended herewith a statement of the amount of time given in the various schools to the courses that are called technology, utilization, forest products, seasoning and other similar names, all of which are grouped in this report under the general heading of utilization courses.

This shows the wide divergence of ideas as to what courses should be given in the various schools.

This is intended to be a preliminary or progress report. After the educational conference preceding the annual meeting of the S. A. F. at Philadelphia, it is believed the atmosphere will be considerably cleared as a result of the discussions. Next year a more complete report should be submitted if the General Committee on Education is continued.

Subcommittee on Education in Forest Products,
NELSON C. BROWN, *Chairman.*

NON-PROFESSIONAL COURSES AND EXTENSION WORK IN FORESTRY

The subcommittee on extension is expected to include all those educational activities which are not directly connected with the professional schools of forestry or research work. We have tried, therefore, to reach

TIME DEVOTED TO UTILIZATION SUBJECTS IN AMERICAN FOREST SCHOOLS

SUBJECTS		CLASS HOURS PER YEAR (Basis of 40 weeks per college year and one Laboratory period—one Class Hour)																
SCHOOL		Univ. Idaho	Univ. Ga.	Ore. Agr. Coll.	Penn. State	Univ. Wash.	Univ. Mont. †	Univ. Maine	Mich. State Coll.	Cornell Univ.	Iowa State	N. Y. State Coll. of For.	Univ. Mich.	Mont. Alto	Univ. Minn.	Univ. Cal.	Univ. N. H.	Yale
Logging.....		60	60	126	50	80	98	20	53	30	30	60	60	40	33	84	50	—77—
Milling.....			***	48	50	60	22	40		30	25	60		40	33	86	20	
Milling and Merchandising.....		60						***	40	40								
Milling and Products.....													60					
Products.....		60	60		80	60	22	20	53	40	55	60		50	186*	30	50	35
Merchandising.....					40						55	60			55	60		
Wood Structure and Identif.....		80	60	154	60	60	33	60	120	44	44	60	40	60	120	80	100	99
Timber Testing.....				36	20		33		30		25	60	40				30	
Mech. and Phys. Prop.....		40	***	***	40	**	***	**	**	24	15		**	60	200	**	30	29
Preservation.....		60	9	***	***	***	***	20	***	16	15	60	***	***	33	***	10	29
Seasoning.....				36	40 kiln		25	8 ^{no}	8 ^{no}	16	35 ^{no}	120 kiln	20 ^{no}	20 ^{no}	33 ^{no}	20	30 ^{no}	***
Field Experience..... (Taken in College year)				180	26	Summer Work	30	60	6	10	15	18	6	45	44	11	30	18
Total Credit Hrs. for Graduation... (all subjects)		140	86	207	173	128	204		192	120	225	132	130	171	204	130	216	83
Semesters per College Year.....		2	3	3	2	2	3		3	2	3	2	2	2½	3	2	3	2
No. of men giving above Courses...		2	2	3	3 ^d	1		2 ^b	2 ^a	4 ^e	1	7	1	2 ^b	4 ^e	2 ^f	2	3

EXPLANATION OF ASTERISKS AND LETTERS

- †—Figures Univ. Mont. for Lect. and Rec't only.
 *—Gives 60 hrs. of this in Freshman year.
 ***—Included in Wood Structure and Identif.
 ***—Included in other courses.
- a—One man gives ¼ of his time and one man ½.
 b—One man gives ¼ of his time and one man ½.
 c—Two men give full time and two men ½.
 d—Each man gives ¾ of his time.
- e—One man gives ¾ of his time, one man ¼, two others give some time.
 f—One man gives all of his time and one man ½.
 ne—No equipment available.

definite conclusions in regard to the following methods of educating the general public.

1. General courses in conservation and forestry; courses in farm forestry, dendrology, timber physics, etc., designed to meet the needs of special classes of students; reading and correspondence courses.

2. Work with agricultural county agents in the preparation of exhibits, movies, lectures, slides, tours and demonstrations.

3. Education of the general public by lectures, articles, news items, cooperation with Women's Clubs, the Boy Scouts, the Girl Scouts, and summer camps.

4. The inclusion of more forestry in the public school curriculum through the preparation of suitable text books, contests, movies, special courses in agricultural high schools and normal school courses.

EXTENSION WORK IN COLLEGES

In giving general courses in forestry to academic students who wish merely a notion of the proper relative place of forestry, it is better to include forestry as part of a general course in conservation rather than to attempt our own problems. In special service courses like those given to general agricultural students, architects, or engineers, where some special phase of forestry is concerned, an opposite procedure should be adopted. These lecture courses should be made as definite and concrete as possible. An outline is given in Exhibit 1 of a typical course in farm forestry. An outline of a reading course is given in Exhibit 2.

AGRICULTURAL COUNTY AGENT WORK

While the work with the agricultural county agents in its early stages took the form of general lectures it has now progressed in most states so far that the growing of timber as a crop can now be stressed in its many special phases.

The white pine blister work is an illustration of such specialization. Likewise special demonstrations are now being given in such subjects as thinning, planting, estimating, etc. While no means should be overlooked to extend the knowledge of forestry among farmers by lectures, movies, collections of lantern slides, essay contests and exhibits, the extension foresters will come to spend more and more of their time on actual demonstration areas. The size of these will vary from a few acres to one hundred acres or more and by the keeping of records much valuable information will be accumulated besides furnishing the county a concrete illustration of what a good farm woodlot should be. When

we have a number of such demonstrations located in every timbered county in the United States, farm forestry will have arrived. Exhibit 3 is an easy contest form letter.

EDUCATION OF THE GENERAL PUBLIC

Here again "shot gun" methods are necessary where general audiences are to be addressed. There will always be a demand for such general lectures especially if the speaker has a reputation of being a story teller, and no opportunity of this kind should be neglected. But even more effective work can be done by cooperation with such organizations as the Women's Clubs, the Boy Scouts, the Girl Scouts, etc. For example, every summer camp should be furnished with a definite program for carrying on their work in forestry. A suggested form is given in Exhibit 4. Exhibit 5 is an outline for work by Women's Clubs.

EDUCATION IN PRIMARY AND SECONDARY SCHOOLS

The problem here is more difficult because the approach must be more subtle. Forestry should not be boosted out of its proper relative importance. Only in the agricultural high schools are special courses in forestry in place. In the other grades and courses forestry must be correlated with general education in geography, nature study, and the like. Unfortunately this will involve rewriting many of the textbooks and the re-education of many of the teachers, and your committee regards this as the most important job for the future within the field.

Subcommittee:

K. W. WOODWARD, *Chairman*,
C. R. ANDERSON,
J. A. COPE,
P. D. KELLETER,
W. R. MATTOON.

EXHIBIT ONE

OUTLINE OF A COURSE IN FARM FORESTRY

1. General plan of the course.
2. Identification of the principal local tree species.
3. The uses and value of the farm forest.
 - a. Methods of estimating.
 - b. Uses of the principal species and their sale value.
 - c. Costs of logging, manufacture and growing.

- d. The best sizes to grow and stumpage prices.
- e. The world supply of timber.
- 4. Protection of the farm forest from fire, insects, fungi, trespass, unjust taxations, etc.
- 5. Methods of regeneration.
 - a. Artificial—nursery methods, planting out, etc.
 - b. Natural regeneration.
- 6. Thinning immature stands.
- 7. Management for sustained annual yield.
 - a. Relation of the forest to other farm crops and land uses.
- 8. Town, state, and National Forests.
- N. B.—Topics 3-7 should be considered separately for each forest type.

EXHIBIT TWO

UNIVERSITY OF NEW HAMPSHIRE—EXPERIMENT STATION
Extension Service
AGRICULTURAL READING COURSES

Question List No. 1

THE FARM WOODLOT

In answering these questions the best results will be obtained if they are applied to some woodlot, preferably your own. Naturally, however, if this is done some of them will not be pertinent because no woodlot has all the possible combinations which must be provided for in the questions.

1. Describe your woodlot with reference to the following points:
 - a. Location by town and distance from nearest railway station.
 - b. Height above sea level.
 - c. Degree of slope.
 - d. Exposure.
 - e. Depths and character of soil.
2. What is the composition of your woodlot by number? Count all the trees above five inches in diameter on sample acre.
3. Is it a pure or mixed stand?
4. Did it come from seedlings or sprouts?
5. Is it even aged or uneven aged?
6. What are the most valuable species?
7. Under what conditions do they produce seed abundantly?
8. What light and soil conditions do they require for germination and seedling growth?

9. What would be the ideal method of securing a young stand of these valuable species?
10. What modifications in this ideal method are necessary for economic reasons?
11. Have you any areas in your woodlot where valuable tree growth is not already started? What are the soil conditions?
12. What species will do best in these places?
13. Can you purchase them or raise them most successfully?
14. How many will you put in per acre and how old will they be?
15. What method of planting will you use and what tools will be required?
16. Have you any young stands in your woodlot in which the lower branches are dying out?
17. Are these trees growing straight and tall?
18. How should these stands be thinned in their growth?
19. What thinning can be done a few years in advance of cutting?
20. What can reasonably be expected from skillful thinning in accelerated growth, heavier yields, and better quality of timber?

Question List No. 2

1. What have been the main causes of forest fires in the vicinity of your woodlot for the last five years?
2. How many of these could have been prevented? By what means?
3. Has the fire warden in your town made arrangements so that he could get an adequate number of well equipped fire-fighters to your woodlot at short notice if fire should threaten it?
4. Have you plowed fire lines on the west side of your woodlot?
5. What parts of your timber would be most seriously damaged in case of fire? Can such damage be prevented if you spend an hour a year for each acre in preventive work?
6. If the gypsy moths are attacking your timber, what can you do to prevent further damage to your softwoods?
7. Under what conditions is white pine weevil attack least serious?
8. How can the white pine blister rust be prevented from attacking your woodlot?
9. How may thinning aid in the protection of your woodlot from fire, insects, and fungi?
10. What system of taxation will enable you to let your woodlot grow until it is fully mature and yet not exempt it from paying its fair share of the town's taxes?

11. Are hardwoods more or less used than softwoods for all purposes to which wood is put?
12. About what per cent of the average tree can be made into timber? What can the rest of it be used for?
13. How can the demand for firewood be utilized to get rid of damaged and defective trees?
14. What are the main uses of the most abundant softwood in your woodlot whether it is white pine, hemlock, or spruce?
15. Into what widths and lengths should your softwood be cut to bring the best prices?
16. What is the present price of softwood lumber, mill run, at your nearest railroad station?
17. Is the quality of your mature timber better or poorer than the average for your vicinity?
18. Have you enough of the better grades of lumber to make it worth while to sort them out?
19. Can you get more for your mature timber if you receive a high price for the better grades or a lower figure for all that is merchantable?
20. How can you best dispose of the poor logs and tops so that the area will be cleaned up, the fire hazard reduced, and the area left in good shape for another crop of timber?

Question List No. 3

1. Can you make use of your farm labor and teams in logging your mature timber?
2. How much has it been costing to log woodlots?
3. If you used your own time and teams, how many man hours and team hours would be necessary?
4. What arrangements can you make to insure proper care being taken to avoid damaging the immature timber?
5. Is there any reason why the general rule that softwood brush can best be burned at the time of logging does not apply to your woodlot?
6. What has round edged lumber been selling for?
7. What commission does the sawmill operator usually make?
8. What has stumpage of the various species grown in New Hampshire been selling for?
9. Is your margin for stumpage greater in the case of your hardwood or your softwood?

10. Can you use cordwood cut from dead and defective trees yourself or for sale?
11. What method of estimating is best for your woodlot?
12. What part of the trees on a 40-acre woodlot should be actually measured in estimating the amount of timber on it?
13. What are volume tables and how are they used?
14. How do white pine, spruce, white ash, red oak and aspen compare in rapidity of height and diameter growth?
15. Which of these species are found in the densest stands per acre?
16. What are reasonable yields per acre for stands of white pine, red spruce, white ash, and chestnut fifty years old?
17. How is it possible to determine at what rate your timber is growing by measuring sample plots in your stands?
18. What should you set as the standard of production per acre annum for the different stands in your woodlot?
19. What protective work, thinning, replanting and cutting of mature timber should you do within the next five years to bring your woodlot up to this standard?
20. How many hours per acre per annum can you afford to spend in your woodlot?

Text Book:

Price Postpaid

Manual of Forestry for the Northeastern United States, by
Hawley & Howes, John Wiley & Sons, New York City \$1.50

Supplementary Books:

Principles of Handling Woodlands, by H. S. Graves.....	1.50
All Elements of Forestry, by Moon & Grown (published by John Wiley)	2.00
Farm Forestry, by J. A. Ferguson & Sons, New York City	1.25
The Farm Woodlot, Cheney & Wentling, Macmillan Co., New York City.....	2.10

Supplementary Bulletins:

Division of Publications, U. S. Dept. of Agri., Washington, D. C.	
Bulletin 152—The Eastern Hemlock.	
544—The Red Spruce.	
Forest Service, Washington, D. C.	
Bulletin 42—The Woodlot	\$.15
36—The Woodsman's Handbook.....	.25
96—Second Growth Hardwoods in Connecti- cut15

82—Protection of Forests from Fire.....	\$.15
76—How to Grow and Plant Conifers in the Northeastern States10
Circular 163—Paper Birch in the Northeast.....	.05
172—Methods of Increasing Forest Produc- tivity05
171—The Forests of the U. S., Their Use....	.05
Farmers' Bulletins, Division of Publications, U. S. D. A.	
516—The Production of Maple Sirup and Sugar.	
622—Basket Willow Culture.	
742—The White Pine Blister Rust.	
Reprint from Yearbook 1910—Management of Second Growth Sprout Forests.	
New Hampshire Experiment Station	
Extension Bulletin 3—Marketing White Pine in New Hampshire.	
Circular 22—Firewood.	
Press Bulletin 39—Planting Forest Trees.	
37—Pruning the Pine Woodlot.	
22—Suggestions for Cutting White Pine Lot.	

EXHIBIT THREE

Dear Teacher: SCHUYLER COUNTY ESSAY CONTEST

The Schuyler County Farm Bureau is conducting a county-wide campaign to get forest planting started on the many thousand acres of idle land in the county. In order to stimulate interest in this commendable project, it has been decided, with our approval, to conduct an essay contest in the rural schools of Schuyler County.

We are enclosing the rules of the contest and it is suggested that you bring the matter to the immediate attention of your pupils and encourage them to enter the contest. Information other than that to be found in the Cornell Rural School Leaflets will be sent you by Mr. L. O. Bond, the Farm Bureau Agent at Watkins, in the way of pamphlets and mimeographed sheets.

Trusting that we may have your cooperation,

Very sincerely,

.....District.
School Superintendent.

.....District.
School Superintendent.

OBJECT

To interest school children in the Schuyler County Tree Planting Project.

PRIZES

1st	4 each	value	\$10.00
2nd	4 "	"	5.00
3rd	4 "	"	3.00
Special Prize for Originality.			

ELEGIBILITY

Any child in district schools of not more than four teachers.

RULES

1. Essay shall be on subject "Why should we plant forest trees on the idle lands in Schuyler County?"

2. The essay shall consist of not more than 500 words, and shall be written in ink on one side of the paper only, using standard letter paper 8x10 inches.

3. Each essay must be folded and placed in a plain envelope bearing the name, age, school district, and address of the entrant.

4. The contest opens the 15th of October and closes the 15th of November, 1926.

5. The teacher of each school shall forward all essays entered from their school to the Farm Bureau Office in Watkins not later than November 20, 1926.

6. For the purpose of awarding prizes, the county shall be arbitrarily divided into four districts as follows:

No. 1. Town of Hecter

No. 2. Towns of Tyrone and Reading

No. 3. Towns of Orange and Dix

No. 4. Towns of Montour, Catherine, and Cayuta.

A first, second, and third prize will be awarded in each of these districts and a county-wide prize for the most original essay will also be awarded.

7. A committee of three judges consisting of 1. _____; 2. _____; 3. _____; will make the awards. Consideration will be given in awarding the prizes to:

1. Grasp of the problem involved.

2. Logical and convincing presentation.

3. Correct spelling, English, and neatness of appearance.

8. Information concerning this important problem will be found in various numbers of the Cornell Rural School Leaflet, which are on file in each Rural School, particularly the Sept. No. for 1923, 1924, 1925 and the Nov. No. for 1921, and the Jan. No. for 1926. Additional information will be supplied by the Farm Bureau.

EXHIBIT FOUR

SUGGESTIONS FOR THE TEACHING OF FORESTRY IN SUMMER CAMPS FOR BOYS AND GIRLS

1. Collect specimens of the leaves and fruit—where possible—and draw, blue print or press these specimens. Give both the common and scientific name in each case.

2. Collect and label specimens of the wood of the local tree species. Tell what each is used for.

3. Thin out a young stand so as to increase its growth. Use the material taken for firewood, fencing, etc.

4. Visit a logging job and photograph each step. Usually the following steps are in progress: Felling, Bucking into logs, Skidding, Hauling to the mill, Milling, Sticking the lumber.

5. Visit a local wood using industry and report on the following points:

- a. Where does the wood they use come from?
- b. Is it in logs or lumber?
- c. What is the poorest quality they can use in length, breadth and percentage of defects?
- d. What is the finished product?
- e. What steps does it go thru?
- f. How is the finished product sold?
- g. How much education do the workers need?
- h. What sort of training has the manager had?

6. Visit and photograph all the fine scenery in your neighborhood. Discover some scenic attraction and build a path to it.

7. Collect and label all the destructive forest insects in your locality. Know how they can be controlled.

8. Visit the nearest fire lookout tower. Draw a map showing the location of your camp in the lookout's district. Build a "safe" fire-place at some spot used by campers. Letter and put up signs cautioning against fire. Patrol a stretch of road during a dry season, cautioning all passersby about fire. Act as messengers for a fire fighting crew.

Understand what damage a forest fire does, how it should be fought, and how fires can be prevented. Visit an old fire and estimate in dollars the loss in growth, lumber, cordwood, taxes, wages, and human life.

9. If in a white pine region understand and do white pine blister rust control work.

EXHIBIT FIVE

SUGGESTED PROGRAM FOR 1926-1927

Forestry Department of Women's Clubs

October—Shade Trees.

1. Need of a survey of the town to determine the condition of the shade trees, the amount of repair work necessary, and the places which need new trees.
2. Method of making this survey.
3. Means of giving the findings of this survey the necessary publicity.
4. The town tree warden and his duties.
5. Raising the funds for the tree warden to work with.
6. Securing new trees.
7. Books and pamphlets on the care of shade trees.

November—State Legislation.

1. State laws now in force with reference to fire protection, state forests, blister rust control, taxation, etc.
2. The relative position of N. H. in regard to state legislation.
3. The deficiencies of our present laws.
4. How the Club can help in making further progress.

December—Federal Legislation.

1. What the Federal Government is doing in fire protection, national forests, research, extension work, education, etc.
2. The relative position of the U. S. in forestry.
3. Pending legislation in Congress.
4. What the Club can do to help.

January—Town Forests.

1. What Town Forests are and what they can do for the local timber supply, water supply, and recreation.
2. Reasonable costs and returns.
3. Methods of procuring.
4. A plan for publicity.
5. Suggestions for sites in your town.

February—Forestry at the Town Meeting.

Specific measures needed in the town like appropriations for white pine blister rust control, special fire protection, etc., which are likely to come up at town meeting.

March—Planting Trees for Timber Production.

1. What species are best to plant.
2. Where they should be planted.
3. How they should be planted.
4. The cost of planting and the probable returns.
5. Planting that needs to be done on town forests or school grounds.

April—Care of Shade Trees.

1. What kind of trees to plant and where they can be obtained.
2. How to plant shade trees.
3. Protecting shade trees.
4. Tree surgery, methods and costs.

May—Vacation Trips in the Woods.

1. Where to go.
2. When to go.
3. Outfits for different kinds of trips.

A CHAPTER IN AMERICAN FORESTRY HISTORY

THE ASSOCIATION OF EASTERN FORESTERS¹

By AUSTIN F. HAWES

President of the Association of State Foresters

Much material important to history is never recorded because there is no definite time when it ceases to be a current event and becomes history. In the case of an association such as this, which functioned well for a number of years, and finally passed out of existence, there can be no question that its meetings and activities form a chapter of American Forest History. That it is a chapter well worth recording before it is entirely forgotten will be acknowledged by all who were connected with it. It was the first organization of American foresters to hold regular field meetings in the woods, a custom which has now been adopted by the various sections of the Society of American Foresters. At the time of its inception (1908) the Society of American Foresters was a small society entirely dominated by the U. S. Forest Service. Foresters outside of Washington got comparatively little from it except the "Proceedings" which were later joined with the "Forestry Quarterly" to make "The Journal of Forestry." Out of the Association of Eastern Foresters grew the existing Association of State Foresters, an organization of national scope.

It must have been in the fall of 1907 that Gaskill and I, while inspecting the experimental plantations in Rainbow, Conn., talked over the value of similar meetings for a group of state foresters. Upon the call of Mr. Gaskill, at that time Forester for the Forest Park Reservation Commission of New Jersey, an initial meeting of state foresters was held at Lüchow's Restaurant, 110 East Fourteenth Street, New York City, on January 11, 1908. There were present Gaskill, Pettis, Chapman, Wirt, Besley and Hawes. An informal organization was effected with Gaskill as secretary and it was decided to hold an annual or semi-annual meeting.

The first outbreak of the Blister Rust was discovered on white pine in New York in the spring of 1909 and a conference of foresters and pathologists was held early that summer in the office of the Fish and Game Commission, 1 Madison Avenue, to consider this disease.

¹ The preparation of this article was made possible through the very complete files kept by W. O. Filley.

There was some talk of a field trip to the infected plantations, but this did not take place.

In the call of the next informal meeting of the "Eastern State Foresters," held November 11, 1910, in the office of the New York Fish and Game Commission, the secretary wrote: "This meeting will consider the problems of the various states, especially with reference to the control of insect pests and diseases by State and National legislation. It is desirable also to consider whether other foresters than those engaged in state work shall not be asked to join us, and to arrange for more frequent meetings." At this time a formal organization of the Association of Eastern Foresters was accomplished. The question of membership was covered by the following resolution: "This association shall consist of State Forest officials and instructors of forestry in Harvard, Yale, University of Maine, Massachusetts Agricultural College, Pennsylvania State College, and Pennsylvania Forest Academy and such other foresters as the association may admit." The territory covered by the association was to include: "New England, New York, Pennsylvania, New Jersey, Delaware and Maryland." The object was defined: "to bring about closer relations between the various State Forest officials in order to promote the interest of forestry, and to bring about a closer co-operation between the State Forest officials and the forestry educators." The temporary organization chosen by those present was: Chairman, Alfred Gaskill, New Jersey; secretary, Charles P. Wilber, New Jersey; organization committee, Gaskill, New Jersey; Spring, Connecticut, and Hawes, Vermont. Besides these officers there were present at this organization meeting: Messrs. Ring, Maine; Pettis, New York; Filley, Connecticut; Wildes, Vermont. It is interesting to note from the correspondence about the schools which should be eligible for representation that Columbia was contemplating the establishment of such a school at that time. The question of admitting private foresters was an ever recurring topic of discussion at these meetings. It is rather amusing in looking back over the years to think of electing Philip Ayres only by virtue of his lectureship at Dartmouth. As Gaskill said in pleading for a broader membership: "To my mind there are two reasons why we should not be too exclusive. First, we want all the men whose knowledge and experience are likely to be of value. Second, we want a membership large enough to insure us at least two meetings a year."

A constitution ratified at a meeting held January 12, 1911, in the Hotel Raleigh, Washington, provided that: "Membership in the asso-

ciation shall be limited to forest officials, and forest instructors attached to universities or to state schools of forestry in the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New Jersey, New York, Pennsylvania, Delaware, Maryland, with such other professional foresters as may be elected." It also provided for one officer, a secretary, which position Mr. Gaskill held for several years and afterwards Mr. Wilber. There were 21 charter members as follows:

CHARTER MEMBERS

Forest Officials

E. E. Ring, Maine
E. C. Hirst, New Hampshire
A. F. Hawes, Vermont
F. W. Rane, Massachusetts
S. N. Spring, Connecticut
W. O. Filley, Connecticut
C. R. Pettis, New York
G. H. Wirt, Pennsylvania
A. Gaskill, New Jersey
Chas. P. Wilber, New Jersey
F. W. Besley, Maryland

Forest Instructors

R. T. Fisher, Harvard
E. E. Carter, Harvard
F. F. Moon, Mass. Agric. College
J. W. Toumey, Yale
H. H. Chapman, Yale
R. C. Hawley, Yale
R. C. Bryant, Yale
H. P. Baker, Penna. State College
J. A. Ferguson, Penna. State College
E. A. Ziegler, Mont Alto

Members of Association of Eastern Foresters Admitted After Organization

John Briscoe.....Orono, Maine
R. Chapin Jones.....Baltimore, Maryland
H. O. Cook.....Boston, Massachusetts
W. D. Clark.....Amherst, Massachusetts
J. H. Foster.....Durham, New Hampshire
William G. Howard.....Albany, New York
Walter Mulford.....Ithaca, New York
George H. Wirt.....Harrisburg, Pennsylvania
Philip W. Ayres.....Boston, Massachusetts
F. H. Billard.....Berlin, New Hampshire
H. Bristol.....Plattsburg, New York
Samuel Detwiler.....Philadelphia, Pennsylvania
John Foley.....Philadelphia, Pennsylvania
E. A. Sterling.....Philadelphia, Pennsylvania
Ralph S. Hosmer.....Ithaca, New York
B. A. Chandler.....Burlington, Vermont
F. H. Colby.....Augusta, Maine
F. A. Gaylord.....Nehasne, New York
W. G. Hastings.....Montpelier, Vermont
J. S. Illick.....Mont Alto, Pennsylvania
A. E. Moss.....New Haven, Conn.
K. W. Woodward.....Durham, New Hampshire
V. A. Beede.....

From this time on during the next decade this association met regularly twice a year. Probably there were a few meetings whose record is lost, but so far as the available records show they are listed below:

*Meetings of Eastern State Foresters, Later Called Association of
Eastern Foresters*

<i>Date</i>	<i>Place</i>	<i>Host</i>
1. January 11, 1908—	Lüchows, New York City.	
2. Spring, 1909—	Madison Avenue, New York City—	Fish & Game Commission.
3. November 11, 1910—	Madison Avenue, New York City—	Fish & Game Commission.
4. January 12, 1911—	Raleigh Hotel, Washington, D. C.	
5. July 14-15, 1911—	Saranac Lake, N. Y.—	Fish & Game Commission.
6. November 10, 1911—	New York City (Chestnut Blight Conference).	
7. July 15-16, 1912—	Petersham, Mass.—	Harvard Forestry Department.
8. January 6-7, 1913—	Lakewood, N. J.—	Charles Lathrop Pack.
9. July 19-21, 1913—	Wanakena, N. Y.—	New York College of Forestry.
10. July 18-20, 1914—	Berlin Mills, N. H.—	Berlin Mills Company.
11. January 12, 1915—	New Haven, Conn.—	Yale School of Forestry.
12. July 30-31, 1915—	Mont Alto, Penn.—	Forest Academy.
13. January 19, 1916—	Boston, Mass.—	State Forester Rane.
14. June 5, 1916—	Asheville, N. C.—	Southern Forestry Congress.
15. July 11-13, 1917—	Bluff Point, N. Y.—	Delaware & Hudson Railroad.
16. February 1, 1919—	Janssens, New York City.	
17. July 17-19, 1919—	Pitston, Maine—	Great Northern Paper Company.
18. December 15, 1919—	New York City.	
19. July 27-30, 1920—	Grand Mere, Canada—	Laurentide Paper Company.
20. November 12-13, 1920—	Atlantic City, N. J. (Preliminary to formation of Association of State Foresters).	
21. December 8-9, 1920—	Harrisburg, Pa. (Organization of Association of State Foresters).	

It is impossible after the lapse of so many years to describe in detail these various excursions and what they meant to those who attended. They form now a composite picture in the memory of those who were practicing in the northeastern states at that period. There was always something of a thrill on arriving at the gathering place and meeting once more the men who were engaged in what was then a pioneer work. The day or so spent in this congenial companionship amid attractive forest surroundings formed an event which came to be looked forward to from one year to another, and the breaking up of one of these conferences and the scattering of the men to their various states was accompanied by a sense of loneliness. There was usually an informal discussion of some timely subject, but probably the greatest benefit came from observing the beginnings of forest practice and by personal exchange of views. At the Saranac meeting, for example, after inspecting plantations eight or ten feet high, and studying Pettis' nurseries, we conferred on "How to Awaken Interest in State Forest Work" and "How to Establish Plantations on Brush Covered or Weedy Ground." Although there is a great deal more interest in forestry today than there was then, and many brush covered areas have been converted into valuable plantations, these subjects are still live issues.

There were even then subjects of disagreement between members and the Forest Service. The latter's interpretation of what constitutes a navigable stream under the terms of the Weeks Law caused much argument. At the winter meeting in 1911 a paper prepared by Pettis was read on "The Official Definition of a Navigable Stream."

Undoubtedly the association performed an important function in ironing out difficulties between some of the members and the Forest Service. The attitude of these men may be understood from the following quotation from a letter written by Secretary Gaskill to Mr. Graves, August 5, 1915:

"The feeling is unanimous that there is room for a better understanding between many or all of the state organizations and the Federal organization, but that a satisfactory basis can not be reached through correspondence. I was, therefore, directed to write you that the association, or its members individually, would seek an opportunity to talk over some of these matters with you." The outcome of this correspondence was that the Forest Service was invited to send a representative to all meetings of the association. Usually Mr. Peters represented the Service and it is only fair to remark at this time that no one connected with the Forest Service has done so much in maintaining friendly relations with the states as Gervin Peters.

Whatever differences may have existed at times between state foresters and the Federal Government they have never interfered with the state foresters' uniting in the support of the Service when threatened by outside interests. Thus when the western states were clamoring to have the National Forests turned over to them the association on January 7, 1913, assembled at Lakewood, N. J., passed the following resolution which was sent to the members of Congress and was said by Mr. Graves to have been really helpful:

"We, the Association of Eastern Foresters, whose membership includes official representatives of the state forestry departments of nine of the original thirteen states, hereby record our unanimous protest against any movement to transfer the National Forests, held in trust for the people of the whole country, to the control and ownership of individual states.

We hold, from the experience of eastern states, that state departments of forestry now have a large field of work which should be covered in caring for the forestry interests upon state and private lands.

We hold, that the gift of over two billion dollars worth of national property to individual states is wholly incongruous with the accepted

policy of acquisition of land by the Government under the Weeks Law.

We hold, that the ownership and management by the national government of forest lands within states, and the continuance of the present policies of the National Forest service, are of great benefit to the states in stimulating the practice of forestry on the part of states and individuals, and to the permanent industries dependent on irrigation, lumbering, mining and grazing.

We hold, that the national interests affected by the protection of the forests on the watersheds of streams, and the maintenance of a timber supply for treeless regions, demand that the present National Forest policy be continued.

We, therefore, urge upon the members of Congress the necessity of the preservation of the National Forests as the property of the whole people, and that any attempt to deprive the nation of these forests be opposed as constituting a serious menace to the entire movement for forest conservation."

At the New Haven meeting, January 12, 1915, upon motion of Ayres, the following telegram was sent to Congressman A. S. Lever:

"The Association of Eastern Foresters, representing the state forestry departments and educational institutions of the states of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York, Pennsylvania, New Jersey and Maryland, urgently advocates the re-appropriation of the three million dollars that were not used under the Weeks Act."

At the Maine meeting, July 18, 1919, the following resolution was sent to the Secretary of Agriculture:

"RESOLVED, That the Association of Eastern Foresters respectfully submits to the U. S. Secretary of Agriculture the urgent need for a larger measure of co-operation by the Federal Government in the protection of forests from fire. We strongly urge that the annual co-operative fire protection appropriation be increased to \$500,000 and that the navigability restriction be eliminated from Section 2 of the Weeks Law."

"RESOLVED, That the Secretary of Agriculture is also urged to ask an adequate increase in the appropriation for co-operation with the states in prosecuting forest investigations."

Forest diseases, especially the Blister Rust, have always been fruitful subjects for special conferences. In the early stages of the Chestnut Blight this also was the occasion of much discussion. A special conference was held in the office of the Fish and Game Commission in

New York City, November 10, 1911, to consider means of utilizing dead chestnut. "It was indicated that relief would probably have to be found through distillation plants, either for tannin extracts or for wood alcohol, as there appears to be little doubt that all the material available for poles, ties and even posts can be absorbed by local markets." In spite of this rather optimistic outlook Messrs. Detwiler and Barrus were appointed a committee to study and report on the subject. At the next meeting it was suggested that a representation should be made to the Interstate Commerce Commission requesting a special commodity rate for the movement of chestnut timber. A committee was appointed to confer with the traffic managers of the various railroads and to formulate a detailed report with a memorial to the Interstate Commerce Commission; this report and resolution then to be held in reserve until a specific case required action.

Through the Pennsylvania Blight Commission, the Pennsylvania Railroad was induced to grant considerably reduced rates on blighted chestnut wood. The accompanying tariff applied only to shipments entirely within the state of Pennsylvania:

TABLE OF RATES

<i>Miles</i>	<i>Rates</i>
1 to 70 inclusive	35 cents per 2,000 pounds
71 to 80 "	40 " "
81 to 90 "	45 " "
91 to 100 "	50 " "
101 to 110 "	55 " "
111 to 120 "	60 " "
121 to 130 "	65 " "
131 to 140 "	70 " "
141 to 150 "	75 " "
151 to 160 "	80 " "
161 to 170 "	85 " "
171 to 180 "	90 " "
181 to 190 "	95 " "
191 to 272 "	100 " "

A letter describing this action of the Pennsylvania Railroad was sent to the general freight agents of the various railroads of the territory. In this an attempt was made by the signers, Howard, Spring, Cook, Besley, Wilber and Detwiler, to estimate the extent of the damage at that time (July, 1912). Although no claim for accuracy is made, the figures are of historical interest as indicating the stage of the disease scarcely a decade after its introduction.

Chestnut Wood in Six States Most Affected—1912

State	Total stand of chestnut—cords	Chestnut killed or diseased—cords
Massachusetts
Connecticut
Southeastern New York.....	13,134,800	3,283,700
Northern New Jersey.....	860,309	522,231
Eastern Pennsylvania.....	10,733,000	1,707,272
Eastern Maryland.....	

The most encouraging examples of forestry in the Northeast have always been in the white pine type. The excursion to Petersham and the Harvard Forest was accordingly a most instructive occasion. There were nineteen members and seven guests present taxing to the limit the housing capacity of the school. At that time there was considerable controversy between Massachusetts and Connecticut over the relative effectiveness of chemical extinguishers and hand pumps. A competitive demonstration was arranged between Filley, who had brought with him one of the newly devised "Douglas foresters," and Rane, who was an exponent of extinguishers. A large bonfire is hardly a good test of forest fire fighting equipment and each side claimed an easy victory. The writer explained some experiments being made in Vermont with wireless for reporting fires. However, the meat of the occasion was the inspection of the different cuttings under the guidance of Dick Fisher and the discussion of pure versus mixed stands of pine.

Of quite a different nature was the winter meeting at Lakewood where the association was entertained at the Country Club by Charles Lathrop Pack, at that time president of the National Conservation Congress. To those going from the north the mild climate of Lakewood in January was a revelation. The dinner given by Mr. Pack was the only occasion in the history of the association where the members attired themselves in evening clothes. A number of distinguished men of Lakewood and vicinity attended, including Mr. Henry B. Kümmel, executive officer of the New Jersey Forest Park Commission; Dr. Henry S. Drinker, president of Lehigh University, and Mr. Treadwell Cleveland of the Newark Evening News. The official report of the secretary says: "Much good cheer and sage advice made it necessary to omit the formal part of the program." There was also an opportunity to see some excellent stands of shortleaf pine and to watch a representative of the DuPont Powder Company demonstrate the use of dynamite in controlling forest fires. Another demonstration of this

sort was made at Wanakena, N. Y., the following summer. It was sufficiently impressive to justify a resolution favorable to the use of dynamite, especially in peaty soil. It added: "It (the association) would welcome the working out of relative costs and relative speed between this and other methods of excavating ditches in front of advancing fires." The feature of the Wanakena meeting was an inspection of high outlook points and the observation of their advantages and disadvantages. Professor Moon led the discussion on "Regulation of Slash Disposal." This was Raphael Zon's first trip with the association. He brought up the question of Federal and state co-operation in field studies. The excursion closed with a trip across Cranberry Lake and through the holdings of the Emporium Lumber Company under the direction of Mr. Sykes, its president. Several tracts of virgin timber were visited.

These excursions were not usually very strenuous, but the hike to the Hell Gate Camp of the Berlin Paper Company in July, 1914, will long be remembered by John Briscoe and the other fat men who took part in it. However, the attractive camp, good fishing and splendid entertainment furnished by W. R. Brown made up for the difficulties. The main object here was to inspect the cuttings made by Austin Cary fourteen years before. As Cary was not present and no one knew just what he had aimed to do the results of the inspection were somewhat disappointing. The visit to the great Azischohos dam and the extensive plant at Berlin Mills made an instructive feature of this trip.

At New Haven in January, 1915, the question was discussed: "Shall the association affiliate with the Society of American Foresters or modify its organization or its basis of membership?" It was decided that no change should be made. Hirst discussed: "In what ways can a state forester co-operate with state institutions and other state departments?" Prison labor was considered in this connection.

The excursion to Mont Alto, Pennsylvania, in July, 1915, took the members into a region entirely new to most of them. This was in the days of the old commission and the courtesies extended by Messrs. Conklin, Williams and Ziegler made it a memorable occasion. The notice of the meeting announced that "the only expense after arrival would be 50 cents for one lunch." This was at the picturesque Graef-fenburg Inn on the Caledonia State Forest. Several experimental areas were visited besides the school and extensive nurseries. It was oppressively hot weather and the swimming pool was perhaps the most

popular place. The trip included an inspection of a lookout tower, the extensive tuberculosis sanatoria and the Gettysburg battlefield.

Another forester who has done his bit for forestry in the Northeast, and passed into another line of work is F. W. Rane. At that time (January, 1916) he was operating private tracts through the State Forestry Department of Massachusetts. On the occasion of the winter meeting the association went over the Hubbard estate in Wellesley Hills, which was being operated with special reference to the control of the gipsy moth by removing the oak.

The Asheville meeting was an innovation since it was outside the territory covered by the association. Arranged in connection with the Southern Forestry Congress it afforded the members an opportunity to hear some interesting addresses and to inspect plantations from 10 to 25 years old on the Biltmore estate. The 86,000-acre Pisgah tract had recently been sold to the Government by Mrs. Vanderbilt, unfortunately without the timber, and the visitors saw some of the nearer areas.

At Bluff Point the association was royally entertained by the Delaware and Hudson Railroad in its palatial Bluff House commanding a wonderful view of Lake Champlain and the Green Mountains. H. R. Bristol, forester for the railroad, conducted the party through the company's nursery and plantations. It was at a time (1917) when there was great interest in the Plattsburg military training camp. An inspection of this camp and the Dannemora state prison were outstanding features of the excursion. Although the writer was no longer a member, having resigned his position in Vermont, he represented the Forest Service at this meeting, with the special purpose of discussing the wood fuel program. This was advocated as a war measure with the twofold purpose of saving coal and reducing the strain on freight traffic. It was the consensus of opinion that great stress should be laid on a heavy cordwood cut by wood-lot owners during the fall and winter. Propaganda along these lines was carried on during the next year by most of the state foresters, and undoubtedly increased the use of wood considerably in certain sections.

Because of war conditions the meeting in 1918 was omitted. The trip into northern Maine over splendid roads built by the Great Northern Paper Company and the inspection of its cuttings was a memorable one. Sixteen members and fifteen guests participated. This was at the time when there was widespread dissatisfaction among foresters throughout the country with the management of the American Forestry Association and its magazine. After some discussion the

following resolution, framed by Baker, Hirst and Filley, was adopted and sent to the board of directors of The American Forestry Association through Messrs. Alfred Gaskill and W. R. Brown of the board, who were present:

"RESOLVED, That it is the consensus of opinion of the Association of Northeastern Foresters that the work of the president and secretary of the American Forestry Association in increasing the membership and popularizing the magazine, especially during the trying period of the war, has been effective and is appreciated.

But that the time has now come when a definite and constructive program is necessary for the proper development of forestry in this country and that it is our conviction that the American Forestry Association has not been properly functioning in this regard, and that it can not so function unless a clean cut and satisfactory policy is adopted.

Specifically we consider first, that the present board of directors is not sufficiently representative of the forestry interests of the country; second, that the magazine does not contain a sufficient amount of forestry propaganda, and that other forms of forestry propaganda are being neglected; third, that the association has not taken a definite and aggressive stand for the development of forestry, nor has it assisted as it should in specific national and local crises.

Therefore, we most strongly recommend that immediate steps be taken to remedy the conditions outlined.

This association pledges itself to support all efforts which may be made by the American Forestry Association to become a more effective agency for the development of forestry in America."

The forestry world was also shaken by controversy at this time over the question of a national forestry policy. Colonel Graves had started this agitation soon after his return from the war, but two schools had developed—that led by Gifford Pinchot and a committee of the S. A. F. was for control of private forests by the Federal Government; the program advanced by Colonel Graves favored state regulation. Of course the timber interests were for no control at all. The following resolution, drafted by Woodward, Spring and Besley, was sent to U. S. Forester Graves over the signatures of the members present:

"The Association of Northeastern Foresters at its summer meeting July 18, 1919, at Kineo, Maine, having under discussion the principles of a national forest policy as outlined by the Forester, U. S. Forest Service, declares that the association is in complete sympathy with

the movement to bring about the practice of forestry on private lands and desires to co-operate fully with the Forester in inaugurating a national forest policy to this end.

The association after full discussion presents for consideration the following conclusions:

1. As a first step the Federal Government, through the states, should offer protective, remunerative or assuring inducements to woodland owners who agree to adopt reasonable requirements respecting forest management.

2. That the policy should apply to all forest land irrespective of area or ownership.

3. That a land classification and survey of forest resources be undertaken at once to determine the present supply and ascertain the areas which may properly be classified as affording a basis for a future permanent supply.

4. That a great enlargement and extension be made to all appropriate parts of the country of national, state and municipal extension of Federal co-operation in fire prevention and other necessary forms of forest protection.

5. That there should be a much more vigorous and general extension of Federal co-operation in fire prevention and other necessary forms of forest protection."

Elwood Wilson, manager of the forestry division of the Laurentide Paper Company, had often been a welcome guest of the association. In July, 1920, the association made its only excursion outside the country to inspect the work which Mr. Wilson had been carrying on at Grand Mere, Canada, and its vicinity. His nurseries and plantations and the Government nurseries and sand dune plantations were visited. A national forest policy continued to be the chief subject of discussion.

This national program had now become so important in the eyes of the state foresters that a realignment seemed advisable. Only a few states were represented in the Association of Eastern Foresters. In order to get a more nation-wide representation a call for a conference to be held at the Chalfonte Hotel, Atlantic City, November 12, 1920, was signed by Gaskill, Besley, Filley, and Bazeley. This letter said: "The specific object of this meeting is to find common ground upon which the states can support the program of the Forest Service, not to consider the advisability of the Federal program." That Mr. Greeley was heartily in favor of such a conference is indicated by the following paragraph from his letter of October 27, 1920, to Mr. Gaskill:

"I attach great importance to this meeting, feeling as I do that the states themselves, which will be a party with the Federal Government to the contract based on the proposed Federal legislation, should give the Service the benefit of their ideas. In view of the numerous questions likely to arise at the meeting, particularly those which may relate to administrative matters, may I not have the approval of your committee to include besides myself in the Forest Service representation, Mr. Carter and Mr. Peters, also?"

Representatives from Connecticut, Illinois, Iowa, Idaho, Maine, Maryland, Massachusetts, Michigan, Minnesota, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Vermont and Virginia attended this conference. Col. Greeley explained in detail the basis upon which he proposed to distribute the fund that may be made available by Congress. A committee composed of Messrs. Pettis, Forbes, Lusk, Elliott, Besley and Gaskill was appointed to attend a hearing of the House of Representatives appropriations committee. As an outcome of this conference, it was unanimously agreed to form a State Foresters' Association, and a committee of three was appointed to submit a program at the organization meeting.

The organization meeting of the Association of State Foresters took place in Harrisburg, December 8 and 9, 1920. A formal program had been arranged including addresses by Governor Wm. C. Sproul, Dr. J. T. Rothrock of the Pennsylvania State Forest Commission, and Col. W. B. Greeley. A constitution was adopted with slight modifications.

While the formation of this new association had not been expected to affect the Association of Eastern Foresters the result was an apparent loss of interest on the part of the state foresters in the older organization. On March 18, 1921, Secretary Wilber wrote to the members that the new organization would probably necessitate dropping the activities of the Eastern Foresters. Changed conditions in the Society of American Foresters through the formation of strong local sections were also a factor. The regular field meetings of these sections, conducted like those of the Association of Eastern Foresters, provided an opportunity for those not connected with state forestry department. Thus, after twelve years of useful service, the Association of Eastern Foresters died a natural death. The success of the organization throughout the period was due very largely to the enthusiastic work of its two secretaries, Alfred Gaskill and C. P. Wilber.

A FEW TRENDS IN PENNSYLVANIA FORESTRY*

By JOSEPH S. ILLICK

A review of American Forestry reveals many trends. To name all of them would make an extra long list. To attempt to discuss most of them without considering local conditions may lead to very impractical conclusions. I will, therefore, confine myself to a few timely trends and consider them chiefly within the range of Pennsylvania conditions.

Public education in forestry began early in Pennsylvania. At first progress was made slowly by getting a finger-hold here and a toe-hold there. Within a few months it will be fifty years since the Michaux legacy to the American Philosophical Society of Philadelphia became available for a course of lectures in forestry. These lectures, known as the "Michaux Lectures in Forestry," were delivered by the late Dr. Joseph T. Rothrock, Father of Forestry in Pennsylvania. A review of these historic lectures offers ample proof that botany was the gateway through which forestry found a place in Pennsylvania, and that Dr. Rothrock made many earnest advocates by his clear and convincing statements about the forest situation in Pennsylvania. Most of these Michaux lectures—the first efforts in public education in forestry in Pennsylvania—were delivered within the walls of the University of Pennsylvania, where we—members of the Society of American Foresters—now have the privilege of holding our twenty-sixth annual meeting.

Fifty years of Pennsylvania forestry since 1877, when the Michaux legacy became available, show progress in many lines. Standing out among the noteworthy achievements are the results in public education in forestry. In public education in forestry, as in public school work, there comes a time when it is advisable to grade those taking lessons. In my opinion, the time is at hand in Pennsylvania to do graded work in public education in forestry. The big classes will continue to be in the lower grades, taking elementary lessons, but there are others who have had their elementary lessons long enough to merit advancement. They no longer want argument, for they are completely sold to the forestry idea. They stand ready to move forward into more advanced work, and this usually means into more practical forest work. In this group are the forest land owners. They want forestry, but they can use

* Presented before the twenty-sixth annual meeting of the Society of American Foresters, Philadelphia, Pa., December 29, 1926.

it only if presented in a form that it can be taken into the woods. They want to be shown how to practice forestry by methods that are silviculturally correct and economically sound.

Progress in Pennsylvania forestry will henceforth be measured by the extent to which the tree crop becomes a part of land usage. The big thing in forestry is to get it into the ground. This is as truly an educational project as getting it into the schools. But it can not be done by old school room methods. This undertaking calls for a modified scheme in forestry education. In making provisions for it, a few fundamentals in general education must be considered. One of them is that most human knowledge is acquired through the gateway of the eyes. Some of the foremost educational authorities say that 90 per cent of all human knowledge is acquired through ocular avenues. Others place it at 75 per cent, and some at 60 per cent. Irrespective of which figures we accept, it follows that in developing a broader plan for practical education in forestry, visual methods merit full consideration.

There is no better way to take advantage of this fundamental principle in education than to transfer more and more of our forestry lessons to the woods. In the past, practically all forestry lessons were taught in school houses or in other indoor meetings. The right thing to do is to transport the pupils to the woods instead of hauling the forestry material to the school house. This is entirely in keeping with modern public school practices. Each year an increasing amount of school work is done in the out-of-doors. The school journey is rapidly becoming an active function of modern education. Last spring while studying the forests of twelve European countries, I met many teachers with their classes taking journeys in the woods. On a single morning near Tharandt in Saxony, Germany, I met six groups of children with their teachers in the forests studying outdoor lessons. I chatted with a number of the teachers and with their pupils, and was impressed with the practicality of their scheme of outdoor education.

Forestry will take a big forward step when we make fuller provision for forest journeys. This includes not only schools, but also clubs, associations, councils, committees, and other organized groups. We must do more than approve these school journeys and forest tours. It is our duty to provide worthwhile objectives for them. To tell those interested in forestry where they can find suitable study material in the forest is a step in the right direction, and by making available to them interesting and reliable data about each of the suggested study

topics is another forward step. While many object lessons in forestry are now available for show and study purposes, there exists an urgent need to develop additional ones. For want of a better term, I will call one type of urgently needed study projects "demonstration plots." These demonstration plots can probably be understood best by discussing some of those established on the State Forests of Pennsylvania. As examples, I will consider "The Caledonia Plantations."

THE CALEDONIA PLANTATIONS

Bordering the Lincoln Highway midway between Chambersburg and Gettysburg are the most talked of forest tree plantations in Pennsylvania. In 1906 the students at the State Forest School, Mont Alto, planted 75,000 trees, most of them white pine, in abandoned fields dotted with patches of grass, clumps of sumac, briar thickets, and a few scattered trees. The resultant tree growth is now widely known as The Caledonia Plantations. Two-year-old white pine seedlings were used in the planting. The trees were spaced 4x4 feet apart, and placed in rows running at right angles to the highway.

Records show that a year after planting 98 per cent of the trees were growing. During the first three years after planting few people noticed the trees. They were too small to be seen. The fourth year they began to lift their tips above the grass. By 1912, six years after planting, the trees had grown enough so that their lateral branches began to meet. Three years later (1915) the branches were so interwoven that the plantation was almost an impenetrable thicket. The leaf canopy was now so dense that the lower lateral branches were dying off for want of light and growing space. Competition between neighboring trees was then very keen. Many of the weaker specimens began to lose out in the struggle. By 1922 seven or eight whorls of lower branches were dead. The tree trunks were then covered with dead branches for a distance of 6 to 10 feet from the ground. These dead lateral branches did practically no harm to the trees. In time they would fall off naturally, but as long as they remained on the trees the plantation was an impenetrable thicket and a fire hazard of the first order. In its natural condition it was not available as an object lesson in forestry. It did not serve as a show place, nor could it be used advantageously for forest studies.

In the fall of 1922 it was decided to treat the planted trees so that they could be seen and studied. Operations were started in January, 1923, and had three main objectives, namely:

1. To make the plantation available as a show place, that is, to demonstrate in a practical way the possibilities of forest tree planting on idle land, and the use of correct methods in handling forest tree plantations.

2. To make possible the establishment of special study and experimental plots for the purpose of collecting valuable information on the behavior, growth, and yield of planted forest trees.

3. To improve the quality of the wood produced by the trees.

In order to facilitate the treatment and make possible the keeping of accurate records, special plots have been established within The Caledonia Plantations for each major study project.

THE PRUNING PLOT

During January and February, 1923, 3.4 acres of white pine in The Caledonia Plantations were pruned. The pruning work was confined to dead branches except along the borders, where green branches persisted down to the ground. As a rule, seven to eight whorls of dead branches were on the trees. Their removal cleared the stems from 6 to 10 feet from the ground. Most of the pruning work was done with hand axes, but pruning saws were also used. A skilled man with an ax in excellent condition can prune faster and almost as well as with a saw, but in case of a miscut, considerable damage is done with the ax, while damage rarely results from the use of the saw.

The cost of the work, based on an operation covering 3.4 acres, was as follows:

	Labor time per acre (hours)	Cost per acre ¹
Pruning	44.1	\$13.23
Burning pruned material.....	31.7	9.51
	<u>75.8</u>	<u>\$22.74</u>

By January, 1926, three more whorls of dead branches had developed above those pruned off in 1923. The pruning work of 1926 was done chiefly with special pruning saws. The use of hand axes was no longer practical. The cost of the 1926 pruning was as follows:

¹ Labor rate 30 cents per hour.

	Labor time per acre (hours)	Cost per acre ²
Pruning	60	\$18.00
Removing and burning pruned material.....	36	10.80
	96	\$28.80

Permanently employed forest rangers did the pruning during the winter months when other forest work was not pressing. At the end of the second pruning the stems of the trees were clear from branches for 18 to 20 feet from the ground. The treated part of the plantation is now open to view, and offers one of the best show and study plots in the forests of Pennsylvania.

The primary purpose of the pruning work was not the removal of the dead lateral branches, but the development of show and study plots. One can not justify an expenditure of \$51.54 per acre on a pruning operation, if the sole purpose of it is an improved quality of the wood, but as an educational project The Caledonia Plantations pay high dividends every day. The pruning work opened a gateway to the development of additional demonstration plots in thinning, growth, and yield studies, and other study projects whose educational value is beyond monetary estimate. No one who really knows the value of these pruned plots would think of abandoning them. The present plan is to duplicate them on an increasing scale in other parts of the State. About twenty similar pruned plots have already been established and more are in progress and still more projected.

THE THINNING PLOTS

Four thinning plots have been established in The Caledonia Plantations. The one plot was treated to a light thinning, the second to a moderate thinning, the third to a heavy thinning, while the fourth serves as a check plot. The first thinning took place in 1923. This was followed by a similar treatment in 1926. Detailed records are kept of conditions before thinning, after thinning, and what was done during the thinning. Among the items on the records covering conditions before and after thinning are: The number of trees, their average diameter and height, the volume, the increment, and an itemized statement of costs of all operations.

² Labor rate 30 cents per hour.

On the heavily thinned plot of one-third of an acre there were 534 trees prior to the 1926 thinning. During the thinning 264 were removed, of which 102 were dead and 162 suppressed or defectives. The cost of the thinning work was:

	Cost per acre ³
Thinning and cutting material into cordwood.....	\$ 9.00
Piling cordwood.....	4.50
Carrying and burning brush.....	5.40
Total	\$18.90

This thinning on the one-third acre plot yielded more than 2 cords of wood. This is at the rate of 6 plus cords per acre. At \$3.00 per cord the returns from the thinnings approximately pay for the operation. Because of the thinning operation, the 20-year old white pine stand is greatly improved. There remain on the one-third acre plot 270 trees with an average height of 30 feet, an average diameter of 4.8 inches, and a total basal area at breast-high of 37.4 square feet. These figures compare favorably with those given in yield tables for site quality I second growth white pine in New Hampshire. More detailed figures of these plots will be published in a special report now in preparation.

These four thinning plots, all of which are clearly demarcated and permanently monumented, demonstrate effectively the general principles of thinning, show the effects of different degrees of thinning, and give reliable cost and yield figures that are of practical value to forest land owners considering this form of forest improvement work. They are first class object lessons in practical forestry.

THE SAMPLE PLOT OF 1916

In 1916, ten years after the Caledonia Plantations were established, a sample plot covering one-tenth of an acre was laid off in a selected area. The boundary lines were carefully surveyed and clearly demarcated. The corners were permanently marked with squared locust posts painted white. All the lower dead branches were pruned off. Every tree was given a number, which was painted on the bark about 5 feet above the ground. In demonstration areas the painting of numbers with white paint is preferable to other methods of numbering, for

³ Labor rate 30 cents per hour.

it attracts attention. A breast-high mark was painted, also in white, on each tree at $4\frac{1}{2}$ feet above the ground. Then, on November 7, 1916, the diameter, height, crown class of each of the 264 trees on the plot was recorded. On February 23, 1922, all the trees were again re-measured. Before growth will start next spring (1927) every remaining tree will be remeasured to ascertain the growth at the end of the 1926 growing season—twenty years after the trees were planted.

This demonstration area is maintained primarily to show the growth and yield of planted white pine in southern Pennsylvania. It shows what may be expected if 2-year white pine seedlings are planted in an abandoned field on a sandy loam soil with a northern exposure at an altitude of 1,000 feet. This plot is well situated for show and study purposes. It is located along a trolley line, less than 100 yards from the Lincoln Highway. The advantages of close proximity to a well traveled highway far outweigh the disadvantages. Demonstration plots deserve a place in the foreground. There is no good reason why worth-while forest studies should be conducted in secluded places.

The records of this sample plot are complete down to the 264 trees. Even the exact year of weevil attack on specific trees is recorded. The value of demonstration areas is in direct proportion to the kind of data that is available concerning them. The establishment of a demonstration plot without collecting and keeping accurate data about it is merely playing with the problem. The planting of trees, that is, the establishment of a plantation, is only one step in the making and maintenance of worth-while demonstration plots.

BLUE RIBBON TREES

The growing stock of a forest is, as a rule, made up of a limited amount of preferred tree stock and a relatively large amount of common tree stock. In a plantation spaced 4x4 feet there are about 2,750 trees per acre at the beginning of the rotation. About 200 to 250 trees per acre remain at the end of an average rotation. About 90 per cent drop out and only 10 per cent remain to make up the final stand. This shows that on an average of every 10 trees planted, only one tree will be a part of the mature stand.

In the handling of forest stands it is now the practice to remove the dead, dying, damaged, and suppressed trees. Under present practices only trees scheduled for removal are marked. On my recent trip to Europe I saw in France and Germany, particularly in the town forest of Heidelberg, a new practice of marking the preferred trees

of a stand early in the rotation. By this practice the forester indicated to his subordinates, woods workers, and to the public what trees in his opinion were to be favored. By this operation the forester demonstrated his judgment of tree quality and visualized an important phase of forest practice.

To demonstrate this practice a special plot was treated in The Caledonia Plantations in November, 1926. The trees, planted in 1906, were pruned and thinned in 1923 and 1926. When this work was completed there remained 270 trees on the one-third acre plot. That is less than 30 per cent of the original number of trees. The others had been eliminated by suppression or thinning. A careful survey was made of the 270 trees that remained, and from them were selected the 66 best specimens, giving full consideration to size, condition, form, and spacing. This was at the rate of about 200 trees per acre. At first a preliminary selection of the best trees was made. They were then re-checked and then the final selection made. Each of the selected trees was marked at about breast-high with a band of blue paint one and one-half inches in width. In Europe the prevailing practice is to mark the selected trees with a band of white paint. In the Pennsylvania plots a band of blue paint is placed about the select trees. For this reason they are called "Blue Ribbon Trees." This is an appropriate name, for "blue ribbon" is an accepted term in America to designate winners or select specimens.

The designation of blue ribbon trees is a good practice, for it brings about economy in forest tendance. In a pruning operation designed primarily for the improvement of wood quality, it is wasteful to distribute operations over 1,000 to 1,500 trees, when we know that only 200 or 250 will reach a size to merit pruning for quality production. Then too, thinning and other stand development operations are simplified if the preferred trees are designated and clearly demarcated. The marking of blue ribbon trees is a practice that merits use in America, especially in study plots and stands under intensive management. It is in keeping with similar practices in stock breeding, poultry raising, and vegetable gardening, in which preference and special attention is given to select specimens early in their development. In white pine stands on an average site, the blue ribbon trees can be selected advantageously between the ages of 15 and 25 years. By this time natural tree competition has gone far enough to enable the forester to select the preferred trees.

SEED SUPPLY STATIONS

Forest tree planting has been moving forward by leaps and bounds. During 1926 more than eleven million forest trees were planted in Pennsylvania. About twenty million will be available for planting in 1927. Large quantities of seeds are required to produce these trees. In 1926 the Pennsylvania Department of Forests and Waters purchased more than 1,000 pounds of small sized seed and more than 1,000 bushels of large sized seed.

In a recent conference with Prof. Muench, one of the foremost tree seed authorities of Europe, I was told that there are growing in Germany 750,000 acres of Scotch pine trees developed from seed of poor and doubtful hereditary quality. In traveling through the forests of Europe one is impressed with the wide range of quality in forests stands, particularly in Scotch pine.

During 1925 white pine seed was bought at \$2.50 per pound, Scotch pine at \$3.50, and red pine at \$12.00 per pound. To say that little is known about the true tree source of this seed is simply stating a bare fact. The bags of Scotch pine seed may carry the label "Riga Scotch Pine." This may satisfy some, for we have been taught that the best Scotch pine stands occur in the Riga District, but the label "Riga Scotch Pine" is no assurance that it came from the Riga District, and much less a guarantee that it came from preferred trees, even if the seed actually came from Riga region. In the Riga District, as elsewhere, there occur inferior trees. This is also true of seed coming from Finland, or the Baltic Region, also famed for their fine Scotch pine.

In my opinion, as long as we continue to take a big chance on the true tree source of our seed supply, we run an equally big chance of establishing stands of poor forest trees. We will not have this situation well in hand until we do as they are now doing in Europe, particularly in supplying their home needs, namely, establish seed supply stations at home.

On the Mont Alto State Forest in southern Pennsylvania, and near the Delaware Water Gap in eastern Pennsylvania, are located two fine plantations of Scotch pine. The plantation at Mont Alto is made up of as fine and promising trees as I have seen anywhere in Europe. American, Swedish, and German foresters who have seen this plantation all spoke highly of its fine quality. This plantation covers 5.9 acres, and when established, contained about 15,000 trees.

In one part of the plantation a special growth and yield sample plot has been located. The early growth records of it compare favorably with the best in Europe. Within a few weeks another special plot will be established in this plantation for the specific purpose of seed production. The trees selected as prospective seed trees will be given a special designation.

Similar seed stations may be established in white pine plantations on the State Forests and on the property of the York Water Company, where now occur some of the finest red pine plantations in the country. Elsewhere, particularly in natural growth, individual trees will also be designated as selected seed trees. By this plan we hope to establish seed supply stations and produce certified forest tree seed. We now have certified seed corn and certified seed potatoes and there is no good reason why we should not work toward certified forest tree seed. When we have done this we will be able to get tree seed of approved qualities. From such seed we have a right to hope to raise trees of good quality. The securing of forest tree seed of approved ancestry is particularly urgent since we know that 50 to 75 and 100 years are required to mature a forest tree crop.

Along the Lincoln Highway and directly in front of one of the Caledonia Plantations is a large painted sign (6x10 feet). On the sign is the following legend:

WHITE PINE PLANTATION

Planted	1906
Pruned	1923 and 1926
When 50 Years Old Will Yield	35,000
Board Feet of Lumber Per Acre	

This simple sign has been very effective in telling the high points of this forest tree planting of 1906. During the past year motorists from every state of the Union and from some foreign lands have admired, and many of them have stopped and studied this orderly army of young white pine trees. While this sign has done a lot of good, it does not go far enough in telling the story of this interesting tree place. More supplementary signs are needed to get the message across. Last spring I had the privilege of inspecting the demonstration plots of the Finnish Forest Service at Punkaharju in Finland. In most respects the Finnish plots were similar to those seen elsewhere, but there was one feature that impressed me as a big improvement over the plots seen in any other forest. Within each plot was a sign board

about 18x24 inches and placed on a 5 to 6 foot post. On the face of the sign appeared a statement giving, as a rule, general information, and in some cases specific information about the plot. The story of every demonstration plot was told in full on a sign board, and each plot had a sign board.

We have too few demonstration plots in the United States, and we know too little about the few we do have. Too often only a single person knows the facts about some of our forest study plots. This is not a wholesome situation. An effective way to bring these plots in the realm of human understanding is to post them adequately with signs telling their full story. We can not go too far in displaying samples of good forestry and labeling them adequately. These plots should strike at the heart of the most serious forest problems, and serve as centers of the best sort of forest practices.

SAYING IT IN THE WOODS*

A PRACTICAL EXEMPLIFICATION OF PUBLIC RELATIONS IN FORESTRY

By JOSHUA A. COPE

One of the most significant contributions to forestry literature in America for the year 1925 was the C. L. Pack prize article appearing in the *Journal of Forestry* for February, 1926, under the title, "Public Relations in Forestry," by John D. Guthrie of the Forest Service. The premise on which Mr. Guthrie's able article is built is found in his statement "that American forestry will make progress only when and until it is supported by an intelligent and wide spread public opinion."

It seems to me there is no gainsaying this premise. Eighty per cent of our entire forest area is in private as contrasted with public ownership, and even the public forest as well as the private forest is being used yearly by millions of urban dwellers as an essential accessory to their camping, hunting, fishing and hiking trips. In rallying the public to the support of a progressive program in forestry, a great deal of waste energy, time and effort may be avoided if we recognize from the start two distinct groups within the public at large.

The first and by far the larger group numerically is our vast and increasing urban population who are largely non-land owners, at least as far as forest land goes, and whose interest in the forest is direct during the vacation period only.

The second group comprises the owners of forest land, a group, as has already been brought out, which controls over 80 per cent of the entire forested area of the nation. It therefore follows as a corollary to Mr. Guthrie's axiom that the adoption of improved practices by these private forest owners will be an index of our national progress in forestry.

We foresters may, by an able use of all the tools Mr. Guthrie has so clearly described, win public support to our forestry program, and hence, have unlimited funds for protection, research, teaching and extension, with the result that the man-caused fires for which Group I are individually and collectively responsible are radically reduced. We can do all that and still have the adoption of improved forestry practices by this forest land owning public lagging far in the rear.

Perhaps some one will interject at this point that when adequate

* Paper read at the annual meeting of the Society of American Foresters, December 29, 1926, at Philadelphia, Pa.

protection, particularly from fires, is assured that we will have achieved satisfactory progress in forestry. Certainly the reverse is true. No satisfactory nation-wide progress is possible until a reasonable protection to the forest crop is assured, but I, for one, believe that there are certain sections of the nation, particularly in the Northeast where protection is in a measure achieved, where the forest owning public is ready for something more positive in the way of forestry than mere protection.

The time may come when improved forestry practices may be made compulsory by legislation, but there is no indication that such measures will come in the immediate future. In the meantime there is a great deal that can be accomplished by an effective use of some of these tools of education, perhaps a little finer, a little keener edged than some of the tools to be used in winning the support of Group I, but none the less the same type of tool.

With these general statements by way of introduction, I should like to present for your consideration some of the most recent developments in the matter of bringing the practices of forestry home to this large group of forest owners. That portion of the forest land owning public with which I have come in rather intimate contact is the farmer group. Individually the forest holdings of this group are small—20-25 acres being the average area per farm throughout the Northeast, but collectively these holdings represent an amazing total. In New York State for instance, farm woodlots comprise one-third the entire forest area of the state. In the matter of idle land which should be planted up to forest trees which represents a different phase of forestry practice, these same farmers in New York own another four million acres. Because of the human equation that enters, in dealing with such a vast number of individuals the problem presents unusual difficulties. Foresters have, however, rightly turned first to this group in endeavoring to secure the adoption of forestry practices because in the aggregate their holdings are so large and because farmers are the largest users of forest products, and therefore on their holdings can improved practices best be exemplified.

Without minimizing the splendid work done in the early days in a necessarily sporadic way without follow-up by the Federal Government, it may be said that State Foresters were the first to make any definite attempt to bring about improved practice on the farm woodlots of their respective states. In fact, in most instances they were charged with this duty by the act which created their office, and not having in

many cases any state land on which to practice, the private owner provided the only means for carrying out the principles in which they believed.

What were their tools in this educational work? Probably the most popular perhaps because it was easiest to apply was the public lecture, which at least had the saving grace of being illustrated.

I would like to go on record as stating that I thoroughly believe in the lecture as an effective tool for interesting the public at large in forestry and particularly in educating this great body of our forest users from the cities in the care and protection of the forests, but as a method of bringing about improved practices on the part of forest owners, I feel that it has been markedly inadequate. First because with the means the State Foresters had at their command such a relatively small percentage of actual forest land owners were reached, and second because the forest owners who did attend came to listen and remained to be entertained (Those certainly are a fine set of pictures you showed, Mr. Cope) but not instructed. Mr. Herbert Smith of the Forest Service put the whole matter very tellingly when he said several years ago, "Our farmers are not woods-minded; they cannot translate into the terms of their own particular woodlot problems, the general principles laid down by the lecturer even when the spoken word is reinforced by a splendid set of pictures."

Another tool that early found favor with the State Foresters in their educational work was the bulletin. When well prepared, written from the farmers' viewpoint, and properly illustrated, the bulletin becomes an almost indispensable help in bringing about improved practices. But it must be admitted that a great many of the bulletins put out in regard to the practice of forestry by woodland owners in the past had the subject matter poorly presented in too technical language and without adequate illustrations. The fatal mistake has also been made of using the bulletins to arouse interest in the practice of forestry; whereas the real function of such a bulletin is to give the owner whose interest has already been aroused by other and more effective means the necessary instructions to bring about improved practice.

To cite a practical example of just what I mean, we have in New York State three state institutions more or less charged with definite responsibility toward educating the forest owning public in forest practice, and collectively and individually these institutions have been by means of bulletins and press articles and lectures presenting these forest practices to the land owners of New York State for the last ten years,

and yet here comes out the census of 1925 to show that in such a simple matter as the protection of the woodlot from grazing animals, such practice is followed in less than 50 per cent of the woodlot area of the state. Mr. Anderson assures me that the same is true in Pennsylvania.

Perhaps the most effective tool that has been used by the State Foresters in discharging their duty toward the forest land owning public has been that of direct contact with and personal service to woodland owners. But even here if the service means only an inspection and report, there is no assurance that improved practices will be inaugurated. A real follow-up is necessary, such as State Forester Besley has devised in Maryland in what has come to be known as the Maryland Plan. In such cases there is no question but that improved practices have been brought about, but when such expensive time consuming service must be multiplied by the tens of thousands to reach even a portion of the forest land owners, it must be admitted that no state has adequate facilities for giving complete personal service.

In theory, these isolated areas where improved practices are in effect are to act as spheres of influence for the whole surrounding community, but they generally have not done so because, in the facilities at the command of the State Forester, there has been lacking a method of effectively reaching the adjacent land owners. Only recently I had my attention called to a woodland under the most practical and intensive kind of management. A working plan for this land had been laid out by the Forest Service over 20 years ago, and it had been consistently followed ever since, and yet not any of the many foresters of the state had ever visited it; and as for the adjoining owners, it was simply a piece of woods to them.

So at this point I would like to state definitely what has been intimated in the foregoing, that the reason why there is not today more wide spread adoption of improved practices on the part of farmers in their woodlands here in the East where conditions and markets are such as to render such practices feasible, is because there has been lacking the facilities to reach in an effective way the large body of resident woodland owners. Admitting that the tools which in the past the State Foresters found at their hands were not 100 per cent effective in carrying on an educational program among farmers, there would not be such a mere handful as there is today of bona fide examples of practical farm forestry, if there had been available for the State Forester effective means for getting his lecture, his personal serviced woodlot, before the land owners en masse.

At this juncture—to be specific, say between 1915-1920—there comes on the scene another forester, the Extension Specialist. From the start, at least a partial success for his job, that of bringing about improved forestry practices, on the part of farmers, is assured because he has access to these farmers in a way that the State Forester never could.

I believe that there are still many foresters today who have no adequate conception of the tremendous organization known as the Agricultural Extension Service reaching out through two thousand county agents, to all the farm lands of the nation covering every phase of agriculture and farm life, an organization that in other lines of agricultural work has in an incredibly short time revolutionized certain farm practices. At first these extension foresters, coming as they did chiefly from administrative jobs in the Federal or State Forest Service, tended to rely on the educational tools with which they were already familiar, particularly the lecture and the personal service, but as they became oriented, they realized that they were a part of a coordinated system, that through the Director of Extension the county agent leader and the county agents themselves reached out to the utmost confines of the state. They learned of the achievements in other lines of agriculture, soil management, dairying, and poultry, and by contact and study learned the methods employed to bring about these changes. They acquired some additions to their vocabularies; such words as cooperator, demonstration, project, plan of work came to have a particular significance and finally they emerged as forestry specialists ready to make a strong bid for a share of the county agent's time and attention to a consideration of his project and his plan of putting it across.

As one Extension Forester put it, "I don't take any great credit for what success I have made in my educational program with farmers. I found myself part of a great organization that in every line of agricultural activity was reaching out to the farmers of the state, bringing about improved practices. I had to climb on the band wagon and go along or else be permanently left behind."

The outstanding advantage that comes to the forester with his title of Extension Specialist is a group to work with. This advantage is so tremendous that it is difficult to conceive how any effective educational work with farmers in this present day can be carried on without such contacts and affiliations. It is true that educational work by means of lectures and movies can be conducted at schools, clubs and granges, but I am talking about real definite improved practices in farmer-owned

woodlots. This group is admittedly not a 100 per cent representation of all woodlot owners, but it does include a large majority of those more progressive farmers who would be the ones to adopt these improved practices anyway.

Another important feature that comes to the Extension Forester as part of the Extension Service system, is the opportunity to multiply his teaching contacts almost without limit. The personal service, which has already been pointed out as a satisfactory method of bringing about improved practices, becomes entirely justified from an expense and time standpoint when you reach with it not one woodland owner but anywhere from ten to a hundred; and this is what is achieved through the demonstration, the tour, the woods meeting. In other words, the Extension Service through its organization makes possible a rare combination of personal service and the lecture method. It makes possible the putting over of the lesson it is desired to teach, right in the laboratory, that is the forest, and not in the lecture room.

Last January there was held in Washington the first national meeting of Extension Foresters and to my surprise the entire two days of intensive activity was concerned with method and not subject matter. The officials responsible for the conference assumed that we were all well-grounded in subject matter. What they were concerned with was how to help us get our teaching presented to the woodland owning public.

The outstanding significance of the conference, to me at least, was the fact that we must dramatize our methods, make them at least different if not spectacular. We are living in an age when everybody within reach of a postoffice box, a rural delivery route, who has access to concrete highways or visits the movies is deluged with advertising and publicity prepared by the most skillful, trained specialists that money can buy. With this commercial advertising we who have ideas rather than material goods to sell, must compete, and to make a success we must employ the same methods to break through the wall of indifference or at least non-interest that each of us throws around life's daily pursuits.

It will be of no avail to us as Extension Foresters even if we do have access through the Extension Service to the progressive farmers throughout the United States, if our methods of approach are not distinctive, different, and calculated to arouse interest.

Let me illustrate by a concrete example taken in connection with the bringing about of improved practices on the farm woodlands of

New York where, as has already been brought out, conditions making such practices possible, are already present. Starting out with the assumption for reasons I have already developed, that the lecture room method, even when illustrated, the news article or the bulletin, had so far proven ineffective in getting improved practices adopted in the woodlands, and realizing further, that the matter of personal service to 180,000 farmers who own woodlands is utterly out of the question, the chief problem presented was how to make woodland owners interested enough actually to come out to the laboratory as distinct from the classroom. There is no question of interest or effective teaching once the men are gathered in the woods. After a cooperator had been secured by the county agent in a suitable locality, a visit was made to the woodlot, and in a one-fourth acre plot, all the trees measured and those marked that should be removed for the improvement of the growing conditions in the stand. A date was then set for the meeting sufficiently in advance, say about three weeks, so as to give the cooperator time to cut the marked material and stack it adjacent to the sample area. In the meantime a selected mailing list, a prospect list if you please, of about 150 names had been prepared by the county agent, and to this group was sent a series of two letters and a postal card. Letters couched in language and made attractive with illustrations, calculated to arouse interest in the recipient. In addition, posters in assorted colors were posted in adjacent communities and there was the usual publicity in the local press.

I shall never forget the initial meeting. It was a raw day early in December, with alternate rain and sleet. The woodlot was along an improved highway, but in a rather sparsely settled section. The meeting was scheduled for 1:30 and by two o'clock we had only half a dozen present, but it was so cold that it seemed unwise to wait longer. Before the marking of another area was completed and the improved area with its neatly ranked cordwood examined, there were 25 farmers present. Without those letters which aroused interest in a matter to which these men had been previously indifferent, we never would have gotten out such an attendance on such a day.

I have gone into detail on this Woodlot Improvement Project because it is of major importance in the farms of the Northeast.

In the matter of tree planting, the same principles of "Saying it in the Woods" can be brought into play. This year forest plantings of some size and age in various parts of the state were made objectives of tours and field days by a thousand farmers. In every case the

interest of these men was aroused by the county agents by sending out attractive letters or by the use of posters.

The forest can be brought to the farmer by means of word-pictures, slides, movies, exhibits, and bulletins. These tools all have their place in an educational movement, but by far the most effective tool to bring about the adoption of improved practices is to take the farmer to the forest, and when you get him there, don't say it with words, but with thinnings, improvement cuttings already made and stacked, or with stately rows of hand-planted trees growing into a thrifty forest.

NEW DYE PROCESS MAY SOLVE THE EASTERN HARDWOOD PROBLEM.

By G. S. WHEELER
New York State College of Forestry

Those who attended the Springfield Exposition in the fall of 1925, may remember the attractive umbrella handles, the distinctive inlaid vases, the novel cigarette cases, and other appealing novelties, made from colored hardwood, dyed in the living tree. It will also be remembered that the display was in the booth of the Forestry Department of the State of Maine, who had been loaned the articles by the Machias Lumber Company. These were not domestic products, but were made in Germany of wood dyed in living trees. This process is the secret of Fritz von Behr, a German scientist, who is introducing it into this country; the Machias Lumber Company acting as the distributors for the United States. The process consists of introducing a water soluble dye into a tree at that time in the spring when the sap is rising. The dye flows through the tree and colors it permanently.

To satisfy themselves of the practicability of the process, the Machias Lumber Company had von Behr come to this country and dye some American hardwoods. This experiment took place near Wesley, Maine, on one of the large tracts of hardwoods owned by the company, and under the direct supervision of Alfred K. Ames, general manager of the company. It was the first time that the process had been successfully accomplished in this country, and the writer considered himself as being very fortunate to have the opportunity to work with von Behr, and gain some first-hand information in regard to the process.

Herr von Behr took charge of the field work, with an interpreter as an assistant. The experiment took place the last of May, 1926, when the sap was just starting to flow in the hardwoods, and the buds were bursting open. The process is practical during only the short period of the year when the sap is flowing at a rapid rate, and will carry the dye up the tree and to the leaves. The principle of the process is to introduce dyes into the living tree and let the transportation system of the tree carry the coloring materials to all parts of the tree. The process is rather complex and will be discussed in detail.

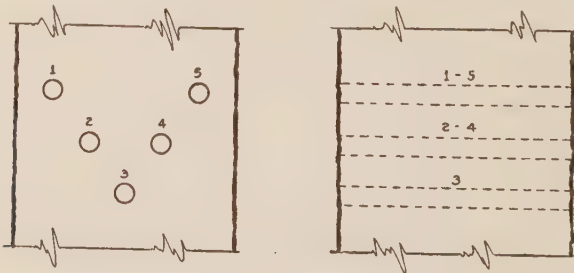
Before any large and valuable trees were inoculated, several small hardwoods of such species as white and yellow birch, maple, and beech and averaging six inches d. b. h., were colored. The idea

was to ascertain whether or not the climate, the various site factors, and the composition and structure of the wood, had any bearing on the process that would necessitate the changing of the composition of the dye, from that used in Germany.

The results of these experiments were very satisfactory, and it was decided to color some larger trees, varying from 12 to 22 inches d. b. h., consisting of the same species as were studied in the previous experiment. One purpose was to dye beech to resemble rosewood, and yellow birch to look like mahogany. The other species were dyed with such colors as red, green, blue, yellow, and violet. Any color can be used satisfactorily in this process, in fact, von Behr has so developed the process that two colors can be used at one injection. One example of this is an ivory colored wood, which he obtains as a result of using more than one color.

It is important to select only sound and well shaped trees. Trees with a large per cent of red heart are avoided, as are poorly shaped trees. The reason is evident. The process is rather expensive, and it would be a poor business policy to bother with trees with a low utilization possibility. From sound trees of good form, at least 75 per cent can be utilized. Care must also be taken to avoid trees with recently broken limbs or twigs, as they will act as a vent through which the dye can escape and be wasted.

The dye is distributed throughout the tree from a reservoir in the trunk, about four feet from the ground. In making such a reservoir, several holes must be bored. A regular green wood auger is used for this work, with a bit about three feet long. Five holes are bored with a one inch auger, at a point up four feet from the ground, through the tree at an angle as shown by the diagram.

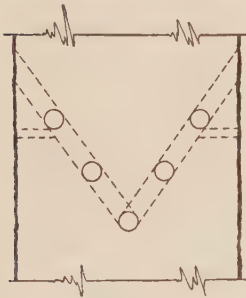


No. 1

Care must be taken to watch for the appearance of the auger on the opposite side of the tree. If the auger was to be run completely

through the tree, it would tear off some bark as it broke through. This would allow the dye to seep out around the hole. As soon as the point of the auger appears on the opposite side, the boring is stopped and the auger withdrawn. It is then inserted on the opposite side and each hole reamed out.

When these five holes have been completed, a rather intricate piece of boring is necessary. These holes must be connected by two other holes, bored in an oblique direction. This is more difficult than it seems at first, as a novice will soon realize when he first attempts to bore a hole at an angle with the grain and hit each tunnel. When this is accomplished, two horizontal holes are bored with a one-half inch auger, from opposite sides of the tree, to hit the upper of the holes as illustrated. By blowing through the holes, the chips and pieces of bark can be expelled. This is necessary as such materials might retard the flow of the dye.

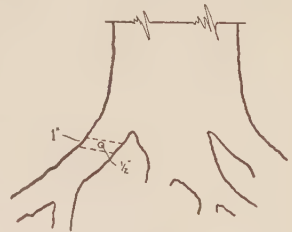


No. II

Then a one inch hole is bored through two or three of the large roots, just below where the butt swell commences. Another hole is bored in a vertical direction to hit the center of the one inch tunnel, as is shown below.

All of the one inch holes are plugged with cork stoppers, about three-quarters of an inch thick, driven flush to the bark and covered with hot pitch to prevent any seepage. Tapered hollow wooden tubes, about five inches in length, are driven in each of the one-half inch holes. To these the rubber tubing that transports the dye will be attached. This completes the construction of the reservoir for the reception of the dye.

A large container, in our case a garbage can holding about sixteen gallons, is hung on the tree about 12 feet from the ground. A petcock with a nozzle, over which a piece of three-eighths inch rubber tubing can be pulled, is soldered into the bottom of the container. The tubing is wired on to prevent its dropping off, and to prevent any seepage of the dye. The other end of the piece of tubing is placed on one of the wooden tubes. This allows a flow of the dye from the container to the reservoir in the tree. The other wooden tubes are connected up with short lengths of tubing, and the tree is ready for the dye.



No. III

First about four pails of clear strained water are placed in the container and the cover attached. To this a pail full of dye is added. The dye is the only secret to the process, and was guarded very closely by von Behr, but the writer has obtained certain information in regard to its character. An aniline dye is used and sodium carbonate is added to set the dye. An aniline dye is water soluble, and that is the reason that it is applicable to this process. The writer has at hand some American dyes that compare to those of von Behr by chemical analysis.

Boiling water was used to dissolve the dye, the dye being slowly added and the mixture stirred constantly, until von Behr was convinced that every particle of the dye was dissolved. The dye was then strained and poured into the container. A tree of 15 inches d. b. h. will suck up the contents of one of these containers in about 18 hours. A tree takes from 75 to 100 gallons of this mixture to completely color it. The first day after the application, there is no change in the appearance of the tree, nor is there on the second day. The third day the leaves assume the color of the dye, and by cutting away a small piece of bark, the colored wood can be distinguished. One might perceive trees with red, blue, green, violet, or yellow foliage, in walking through an area where trees were being treated. It takes about five days to completely color a large tree. About two weeks after the treatment, the leaves fall to the ground. Von Behr insists that the tree is not dead, but will leaf out again next year. This is of no economic importance, as the trees were colored to be used for lumber and not to be left in the woods for posterity.

The colored trees were cut the last of June and were hauled to the mills of the Machias Lumber Company, 30 miles distant, where they were sawed into boards. These boards are now being carefully seasoned and will later be made into attractive novelties and furniture. Woods of various colors are on display at the company's offices in



No. IV

Machias, and several specimens are being shown at the New York State College of Forestry. The color does not destroy the rays, but brings them out clearly. This will be an important factor in its use for furniture. The process has created a lot of interest amongst the profession, the writer having had inquiries from all over the country.

Mr. Alfred K. Ames, vice-president and general manager of the company, says that he is firmly convinced that the process is a success. He admits that the present method of boring the holes is rather expensive, but he believes that it can be so systematized as to be economically negligible. The cost of the dye is the greatest item of expense, as about six pounds of dry dye are used in coloring each tree. It is believed that as soon as a market for these colored products is assured, the cost of the dye will not be prohibitive, when the value of the stock produced is considered.

Many attractive novelties are made from these colored woods. Such products as umbrella handles, door knobs, paper cutters, drawer handles, inlaid jewelry boxes, cigarette cases, brush backs, buttons, candlesticks, and powder boxes all make very unusual novelties. The dyeing of wood for furniture stock will take an important place in the industry, as von Behr claims that he can dye beech to resemble rosewood and yellow birch to resemble mahogany. The writer has a piece of beech on his desk that has a very marked resemblance to rosewood.

Contrary to current reports, the wood is fast colored; boiling and the use of acids having no effect on the stability of the color. The dye even seems to make the wood harder, and instead of fading with age, the color seems to deepen. The writer has seen a fragile hair receiver, made from the colored wood, carelessly dropped on the floor without breaking. This as we all know is unusual for a wooden product.

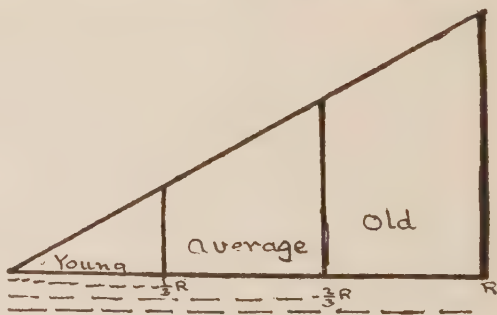
There have been several attempts in this country to color wood in a manner similar to this one, but in all cases the colors have not been fast. In the products of this process the color is permanent, and is so impregnated in the wood, that the only finishing process necessary is to polish the surface. If this industry is favorably received, it will act as a means of opening up some of the large tracts of hardwoods in the eastern United States, which have long remained untouched for want of a favorable market.

THE FRENCH METHOD OF 1883 AND ITS MODIFICATIONS

By M. D. CHATURVEDI
Indian Forest Service

A variety of modifications have been proposed from time to time to remedy some of the objections raised against the French Method in its application in actual practice for the calculation of the annual cut. The French Method is too well known to justify a detailed description of its actual working here. Suffice it to say that it involves the tallying down of all trees to a diameter corresponding to one-third the rotation on which a forest is to be worked. This diameter varies obviously with rotation, species, and factors of locality and therefore in a large number of cases does not coincide with the merchantable diameter which also varies in its turn with species and from place to place.

Both Mr. Belyea¹ (New York State College of Forestry) and Mr. Smythies² (Indian Forest Service) have chiefly concerned themselves with modifying the French Method in such a manner so as to substitute the diameter which is actually merchantable in a locality for the lower limit of enumeration of a forest crop which is fixed in the French Method as the diameter corresponding to one-third the rotation. Considering the fact that the annual yield in the French Method is based on the old wood, the limiting diameter ($2/3R$) of which is not likely to be unmerchantable in any case, it appears that undue stress has been laid on the merchantability of the lowest diameter corresponding to $1/3R$ up to which trees are to be tallied in a forest. Normally there will be no fellings in the average wood towards the yield. There will be thinnings of course in the average wood as indeed there will be thinnings in the young wood neither of which need be logically counted



¹ Journal of Forestry, May, 1926, Washington, U. S. A.

² The Indian Forester, September, 1925, Pioneer Press, Allahabad (India).

towards the annual cut. If part of the thinnings in the average wood happen to be unmerchantable, one need not be so seriously perturbed as to question the very practicability of the French Method. For after all thinnings are governed more by silvical considerations rather than economic. Is it implied that since thinnings in the young wood are unmerchantable there will be none? Granting the fact that thinnings will be carried out in a well managed forest both in the young and the average wood, it seems unnecessary to insist upon the merchantability of only a trifling portion of thinnings round about the diameter corresponding to $1/3R$. As a matter of fact the unmerchantability of the lower diameter of the average wood ($1/3R$) does not affect the annual yield in any conceivable manner. It may influence part of the thinnings in the average wood which will have to be carried out in any case whether merchantable or not.

From the geometry of similar triangles Mr. Belyea has worked out the general normal relation between the young, the average and the old wood in a normal forest and has arrived at the following proportions which exist between them:

$$a^2 : r^2 - a^2 : R^2 - r^2$$

where R is the rotation and a the age under which no enumerations are to be carried out and r a hypothetical age after which trees pass into the old wood. This makes it possible to work up to any merchantable diameter, the age corresponding to which would be a , and the normal proportions can yet be determined. Mr. Belyea has however made a very serious error in assuming that in a normal forest these proportions will be always 1 : 3 : 5. It is obvious that the French ratios 1 : 3 : 5 will only exist when a and r correspond to $1/3R$ and $2/3R$ respectively, and in no other case. If, for example, a and r are equal to one-fourth and one-half the rotation respectively then the ratios will be 1 : 3 : 12 and the relation between the average and the old wood will be 1 : 4 instead of 3 : 5 as Mr. Belyea has supposed. In the normal forest triangle, whatever be the value of a and r the ratios between the young, the average and the old wood will always be given by the relation:

$$a^2 : r^2 - a^2 : R^2 - r^2$$

Then Mr. Belyea's prescription of dividing the merchantable volume of a forest in the ratio of 3 : 5, after omitting the young wood



from consideration altogether, has no meaning whatever. It might as well be divided in the ratio of 99 : 1, or for that matter in any odd ratio and as long as forest is normal, the relations between the young, the average and the old wood will remain normal whatever be the value of a and r . For a normal forest any ratio will work just as well as 3 : 5, and there is no particular significance in sticking to it. The division of the merchantable volume in the proportion of 3 : 5 implies the fixing of the position of r accordingly, and since r can be fixed anywhere in the normal triangle it readily follows that the merchantable volume can be divided in any ratio.

The important point which should be carefully borne in mind is that we generally do not deal with normal forests. The division of the merchantable volume of a forest in the ratio of 3 : 5 (or any ratio for that matter) begs the very question it seeks to enquire. If the forest is supposed to be normal, the ratios will obviously be normal. The question which generally arises is whether a particular forest *is* normal. The special feature of the French Method is that it provides us with a machinery for determining the normality of a given forest. It is precisely this important thing that Mr. Belyea has omitted in trying to modify the French Method. He supposes the normality of a given forest instead of determining it.

Then again in his formula for the annual cut the substitution of a for $R-r$ does not seem to be the correct thing to do. Even in the case of a normal forest the yield can not be correctly calculated by Mr. Belyea's formula. I venture to believe that this new modification of the French Method has very little scientific value and since it seeks to eliminate the only check we have on the normal relation between the old and the average wood in a forest, it is, I believe, useless for practical purposes.

By far the best method of overcoming the difficulties involved in the adoption of the French Method would be to enumerate the entire growing stock up to whatever limit it is deemed practicable. Then by fixing the value of r , the normal proportions between the old and the average wood can be easily determined and the annual cut can be calculated with considerable facility. A hypothetical case of a species x will serve to illustrate my point.

Species	x
Rotation (R)	150 years.
Lowest enumeration limit	8 inches.

Diameter corresponding to rotation 24 inches.

Age corresponding to 8 inches (a) 40 years.

Omitting the growing stock under eight inches (which diameter may be made to coincide with merchantable diameter if it is deemed essential) the remaining crop may be enumerated in the conventional diameter classes. According to the Indian practice which involves enumerations in 4-inch-diameter-classes, the volume of the remaining growing stock would be distributed in the following manner:

Diameter class		Volume		
			cubic feet.	
8-12 inches.....	V_1			} Average wood.
12-16 "	V_2	"	"	
16-20 "	V_3	"	"	
20-24 "	V_4	"	"	} Old wood.

The position of r can now be fixed anywhere to coincide with one of the 4-inch-diameter-classes. Let r be the age corresponding to the diameter of 16 inches (it can equally well be the age corresponding to 12 or 20 inches) and let it be 90 years. The normal proportions between the average wood ($V_1 + V_2$) and the old wood ($V_3 + V_4$) can now be determined by substituting the values of a , r and R in the general formula thus:

$$\begin{array}{l} a^2 : r^2 - a^2 : R^2 - r^2 \\ \text{or} \quad 40^2 : 90^2 - 40^2 : 150^2 - 90^2 \\ \text{or} \quad 16 : 65 : 144 \end{array}$$

Omitting now the young wood from consideration the rest of the growing stock is normal as long as the ratio between the average ($V_1 + V_2$) and the old wood ($V_3 + V_4$) is 65 : 144. If the actual proportions are different then necessary adjustments can be made as is done in the old French Method. The annual cut will now be given by the formula:

$$\frac{V_3 + V_4}{R - r} + \frac{\text{Annual increment of } V_3 + V_4}{2}$$

While removing most of the objections usually raised against the French Method, the above suggestion renders it possible to retain the normality check which is the important feature of the French Method.

It will be seen that it is also possible to chose any limit up to which trees should be tallied which, if need be, may coincide with the merchantable diameter. The position of r can be so fixed as to retain the conventional diameter classes in which the enumerations are to take place and the material is to be sold. Mr. Smythies' modification³ of the French Method while answering all other objections does not provide with the facility of fixing r to suit the usual enumeration

limits. The value of r is fixed automatically in his method as $a + \frac{R-a}{2}$

which usually does not coincide with the conventional diameter class limits and involves, more often than not, decimals of inches. This defect of Mr. Smythies' method is quite serious since it makes the retention of 4-inch-diameter-classes or, any conventional enumeration limits for that matter, impossible. The fact that my suggestion makes it possible to fix the value of r to coincide with enumeration limits is I submit an advance over Mr. Smythies' modification and deserves some consideration.

³ For detailed criticism of his method *vide* Indian Forester, June, 1926.

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Compiled by Helen E. Stockbridge, Librarian, U. S. Forest Service

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REVIEWS

Relation of Birds to Woodlots. By W. L. McAtee. Roosevelt Wild Life Bulletin of the New York State College of Forestry, Vol. 4, No. 1, October, 1926. 152 pp.

This attractive bulletin is the most comprehensive, authoritative and satisfactory treatment of the relation of birds not only to the woodlots of New York State but to the forests of the whole north-eastern United States which has appeared. Mr. McAtee, who is in charge of the Division of Food Habits Research of the U. S. Biological Survey, is well known as an ornithologist, botanist and entomologist, and is eminently fitted to discuss the relation of birds to woodlots.

The discussion is limited to the 70 species of birds which are regular and fairly common breeding species in the woodlots of New York State. Preliminary chapters tell of the changes in the bird life with different seasons, of the distribution of the species in the different life zones, and in their local habitats, which include such headings as wooded swamps, deciduous forest, mixed forest and coniferous forest.

The bulk of the bulletin is devoted to the economic relations of the 70 species considered individually. For each one, a brief description of its habitat and nesting places, is followed by specific data as to the principal elements of its food as they directly or indirectly affect the woodlot. Insects, seeds, buds, foliage or sap as they form part of the species' diet, are specified in detail. Many of these data come from the files of the Biological Survey and have not heretofore been readily available to foresters. An estimate is made of the relative benefit or detriment of each species to the woodlots.

An interesting section is devoted to the rôle of birds in woodlot ecology. Under direct damage to trees, the yellow-bellied sapsucker is the only species whose work is considered significant. Several bud and seed eating species are acquitted of causing more than negligible damage. This subject of seed consumption by birds as it affects the reproduction of the valuable tree species is passed over and dismissed more hastily than one would wish or than its importance probably deserves. Indirect damage includes transmission of diseases and insects, destruction of useful insects and elimination of useful birds. In this connection only the goshawk, Cooper's and sharp-shinned hawks are condemned for the harm they do in preying largely upon useful birds. Birds benefit the woodlots by distributing tree seeds, particularly those of black cherry, cucumber, pines, hickories, oaks and chestnut.

Finally, the owls and hawks are noted as benefitting the woodlots by destroying mice and rabbits.

The principal kinds of forest insect pests are taken up individually and the important bird enemies of each are shown. Actual figures are given in many cases of the numbers of insects or their eggs which birds devour in short periods of time. Two hundred tent caterpillars in a single meal are credited to a cuckoo.

The economic importance of woodlot birds includes their protective, game and recreational values. No other agency is considered to be as valuable to the woodlot in protecting it against insects and rodents.

The final section deals with the conservation of woodlot birds. Protection for them is already provided by law, and may be supplemented by eliminating the vagrant cats, the sharp-shinned and Cooper's hawks and red squirrel. Water, food, and nest boxes can be provided to attract the birds.

Woodlot policies which include fire protection, a system of cleared roads or fire breaks, the elimination or reduction of grazing so that reproduction and undergrowth may develop, and partial cutting all favor the birds as they do the woodlots.

Four plates, two of them colored, and 22 figures add to the attractiveness of the bulletin. Sixty-four references to literature are appended.

J. K.

The Development of Forest Management in Central Europe. By Dr. Ing. Franz Heske. *The Journal of the Cambridge University Forestry Association.* Vol. III, No. 1, 1926. Pp. 21-26.

The evolution of forest management in Central Europe depends chiefly on the development of transportation. Other factors have influenced the line of evolution, as, namely, the use of coal for fuel and the development of silviculture due to the general development of natural history. But the general trend of the evolution was caused by the development of transportation while the other factors merely formed the detail. In the age of undeveloped transportation which lasted in Central Europe until the middle of the 19th century, each center of demand depended on timber and firewood from its immediate neighborhood. The large Central European forests situated further away were unimportant. The exploitation of these forests was limited to the boundaries near towns. The forests near the centers of culture were damaged by wars and by excessive and careless exploitation. All the old forest documents predicted a wood famine.

The aim of forestry in the second half of the 18th century was to gain a sustained yield by a severe temporal order of cuttings. This seemed the only remedy to escape the wood famine. It was an endeavor to banish the wood famine not by silvicultural remedies but by frugality and economy.

To keep a sustained yield, several methods of yield regulation were developed. The chief groups are: the division of volume and increment into equal annual shares; the division of area into equal annual cuts; the periodic method by volume; the peroidic method by area; the formula methods, or methods of comparing actual with normal volume. Besides these, different combined methods.

These methods and studies led to the idea of the so-called normal forest and the transformation of the actual forest to a normal forest grew to be the chief problem of forestry. This applied to the times of undeveloped transportation.

By the middle of the 19th century a network of railroads had sprung up. Coal replaced firewood. Developing industries opened new possibilities of timber utilization. This brought about a great change in forestry. First, the railroads made accessible the distant forests so that the system of sustained yield was no longer thought necessary on the nearby forests. Second, the demand for firewood changed to a demand for timber. Forest management acknowledged this new evolution and changed its methods.

In the middle of the century in Saxony, where forest management particularly flourished, an important step was made. The old method was to divide the forest to be cut over a number of periods. This amounted to a working plan for the whole rotation of a hundred years or more. But every ten years a revision had to be made because of unforeseen alterations in the forest, such as calamities by insects, storm, etc., which might have taken place since the last revision. Otherwise the original working plan for the 100 years remained unchanged. Gradually the knowledge was gained by experience that it was actually impossible to regulate a forest for 100 years or more and the revisions gained the character of new regulations and finally the original working plan lost all its importance. Instead of calculating yield by dividing the whole rotation into several periods, each with an equal volume or area as the old methods did, they started in Saxony to calculate yield by a comparison of the actual proportion of age classes with the normal. The yield was calculated for the next ten years and each revision meant a new calculation. The idea was for each revision to approach

nearer and nearer to the normal proportion of age classes. This method is called the Older Saxonian method or method of age classes and forms the foundation of modern methods in Central Europe. The old systems of sustained working—the periodic methods—required frequent deviations from the normal exploitable age. Often, to gain an equal yield, young crops were prescribed for cutting, and old ones were preserved as the allotting of areas to a number of periods required it. Instead of this under-estimation of maturity by the old methods an over-estimation took place represented by Pressler's theory of financial rotations and Judeich's method of management by compartments adapted to Pressler's theory. To this change of views Judeich gave a new definition of sustained working. The old definition said that equal volumes or areas shortly produce equal yields. The new one merely required reforestation on cut-over areas and that the entire area remain in forest.

Of great importance to further development of forest management was the attitude of the forest operators and owners. First of all the great operators refused Judeich's definition. Every forest owner likes equality in his income. They can't bear to cut an area and wait for a new crop to grow up. These owners wanted a sustained yield. They believed there was a moral commandment requiring them to give their descendants at least the same forest value as they received from their ancestors. Money gained by cutting clear was not the same as crops in the forest. Currency can be destroyed. Also the owner spends it more easily. If silviculture requires this cutting, it is better to invest the money directly in the forests, roads or timber industries, etc.

Secondly, these forest owners refused Pressler's financial rotation. They kept their rotation between financial rotation and rotation of highest income. These forests are inherited and in many cases they are entailed. The owner doesn't intend to sell his property. He is interested in maximum income rather than rate of interest. Besides, the rate of interest is problematical. Factors not expressible by a mathematical formula have a great influence on this calculation.

Last, but not least, the development of modern silviculture influenced the attitude of the owners toward forest management. Natural regeneration was introduced all over and the practical foresters saw prosperity in sound silviculture rather than haphazard calculations.

The result of all this was a new modern method of forest management and determination of yield. It is a combination of the Old

Saxonian method and the requirements of silviculture and financial factors.

An estimate is made of all the trees that are to be cut in the next ten years because natural regeneration is needed or because the trees are decaying, etc. This is a yield from a silvicultural and financial standpoint.

Besides this, a second calculation is made by comparing the actual proportion of age classes with the normal. By this method they tell whether the normal annual cut may be taken or whether more or less. This answers the requirements of a sustained yield but neglects silvicultural and financial factors.

So there are two cutting figures; one silvicultural and financial, the other representing sustained yield. Between the two figures the definite yield is placed. It is a compromise depending on which is more necessary—sustained yield or silvicultural and financial requirements. Every ten years a new calculation is made and a new yield is fixed.

G. S. JAMESON

Die Transpiration unserer Waldbaume [The Transpiration of Our Forest Trees]. Physiology. By Hans Burger. *Zeitschr. Forst.-u. Jagdw.* 57: 473-482. 1925.

Of all the experiments on transpiration of trees, those of V. Höhnelt perhaps alone stand the test of criticism as far as they covered the subject. He measured transpiration for three years with potted plants, 5-7 years old, and concluded, that based on equal weights of dry leaf material, deciduous trees transpire 5-10 times as much as conifers. The only exception is larch, whose transpiration per unit of leaf weight is appreciably greater than that of deciduous trees. However, many investigators have justly questioned the above figure, claiming that the results obtained by young trees are not applicable to older trees, and that the conditions under which the experiment was performed do not approximate natural conditions. Before criticising the results too severely it is best to ask what can be expected in the way of measuring transpiration of trees. It is obvious that we must be satisfied with a comparison of relative values, since the transpiration of individual species is quite variable under changing conditions of available moisture and physical and chemical soil composition. V. Höhnelt's results provide a good basis for building upon, since he gives good transpiration figures per unit of dried leaf substance. To use this data, it is necessary to know the actual volume of dried leaf material for various species at different ages. Engler determined that the green

leaf weight of 4 year old spruce was 60 per cent of the total mass, and of beech 30 per cent; for 50 year old trees, it was 6 per cent and 2 per cent, and for 100 year trees, 3.5 per cent and 1 per cent respectively. V. Höhnel's experiments established that the summer average of transpiration for 100 gr. of air dry leaf substance is approximately 77,000 gr. for beech and 14,000 for spruce. The winter loss of deciduous trees is 0.5-2.5 per cent of the yearly total, while with conifers it is 8.5-12 per cent, larch, of course, falling in line with the deciduous group. It figures out, that the average yearly transpiration per kg. of air dry leaf material is 780 kg. for beech and 160 for spruce. In other words, for the same quantity of leaf material, spruce transpires 5 times less than beech. Using Flury's Swiss yield tables for site quality II for beech and spruce, and 100 year old stands, the green leaf weight for the former is 6,000 kg. per hectare, for the latter 28,000 kg. Reduced to air dry weights these figures become 2,650 kg. and 14,000 kg. and the total yearly transpiration by spruce, even applying a correction for old needles is between 1,700,000 and 1,800,000 kg. of water and for beech approximately 2,100,000, so that the actual transpiration of spruce closely approaches that of beech. These results are tested with Ebermayer's data on the amount of dry leaf material produced yearly by various species which was found to average 3,000 kg. for all trees under equal site conditions. The final data check out practically the same. The results were again checked by applying Rubner's transpiration equivalents per unit of dry wood produced, namely 361 for spruce and 398 for beech, to Flury's site quality II, age 100 years. Increment figures of 12.2 cu. m. for spruce and 6.9 for beech, converted to air dry weight by using Gayer-Fabircius specific air dry weights of 0.47 for spruce and 0.72 for beech were employed. The result was 2,050,000 kg. of water for spruce and 2,000,000 for beech. No matter how the problem is attacked, the same yearly transpiration loss per hectare is found for the two species. V. Höhnel determined that the average yearly transpiration per 100 gr. of dry leaf material of oak is 57,500 gr., for pine only 11,000 gr. In a 100 year old stand on a good site, the foliage per cent for pine is 2.5, for oak about 1.5. According to Schwappach, the growing stock of a 100 year, II site class oak stand is 350 cu. m.; of pine, 400 cu. m. Using a specific green weight of 1.0 for oak and 0.85 for pine and converting to air-dry weights, a hectare of oak forest transpires 1,200,000 kg. and pine only 470,000 kg. per year. A hectare of oak forest transpires much more than the same area of pine, but at the same time its transpiration is much less

than that of spruce and beech. These results indicate that pine, of all European tree species, makes least demand on soil and atmospheric moisture. It is followed not by spruce and fir, but by oak. It would appear that these results have great practical value, although the fact that hardwoods transpire in the aggregate no more than softwoods seems paradoxical in view of various situations relating to soil moisture which do arise. Under normal conditions, it is evident that the indirect effect of stocking upon the water requirement is more important than the direct water use or loss by the vegetation. The effect of rooting habit upon the physical character of the soil, for instance, is of great importance. In the middle European plains region, where spruce is still cultivated artificially, the precipitation should suffice for the cultivation of beech in mixture with spruce, especially when it is employed chiefly to improve the soil rather than to produce lumber. Also no doubt need longer be felt concerning the production of oak, particularly in mixture with pine in localities where spruce finds existence difficult because of lack of moisture. Immediate results may not be striking, however, since the artificial shallow soil produced by clear cutting and other cultural means in raising spruce and pine must first be overcome.

J. ROESER, JR.

NOTES

A Research Professorship in Forest Soils at Cornell University

A gift of \$130,000 for the endowment of a research professorship in forest soils in Cornell University has been announced by President Livingston Farrand, who said that the Charles Lathrop Pack Forestry Trust, founded by Mr. Charles Lathrop Pack, President of the American Tree Association, in addition to endowing the chair, had made a further generous provision of funds for the operating expenses of the advanced line of investigation to be undertaken.

The work will be done in the New York State College of Agriculture, and the appointment of the professor will be announced shortly, President Farrand said. The chair will be named for Mr. Pack, who is already well known for his benefactions to scientific forestry as President of the American Tree Association and as the founder of the Charles Lathrop Pack Forestry Trust. This trust is administered by his son, Arthur Newton Pack.

"In the northeastern hardwood area, extending over the Middle Atlantic States and as far west as Indiana and Illinois, the question of proper forest care and operation depends very largely upon a study of soil conditions, and practically no data on forest soils are at present available," President Farrand said. "The proposed line of investigation is a new development in forest research in this country. It will undertake to co-ordinate studies in several fields of science and apply what is learned to the special soil problems involved in the business of growing healthy forests.

"This research will necessarily deal with the chemistry and biology of soils. It will naturally have intimate relation with the field of heredity in tree growth, particularly as it should help to solve problems of adapting certain varieties of trees to given soils. And it will similarly have a bearing on the field of plant pathology, because of the relation that soil conditions bear to diseases of trees.

"Many of the timber grower's problems are complex. Their solution must be looked for in several fields, including these interrelated fields of soils, genetics and forest pathology.

"This is the first time that such a comprehensive research on forest soils has been systematically undertaken in this country. The comprehensive study of forest soils is a new line of research everywhere, and the only specialized workers in it are a few scientists in Sweden, Russia, Finland and Germany. While the work to be done under Mr. Pack's

endowment will deal directly with American forest problems, its results will have international interest and general scientific value."

Mr. Pack by this gift adds a new and far-reaching link to his already long chain of contributions to the advancement of forestry. He has chosen happily in endowing this professorship at a university where strong existing departments of forestry and soil science will contribute to the effectiveness of the research in forest soils. The gift is a timely recognition of the need of research in a neglected but important field, which is fundamental to the development of sound silviculture.

J. K.

SOCIETY AFFAIRS

New England Section

The New England Section held its winter or annual meeting at New Haven on February 27, the day preceding the meeting of the American Forestry Assn. There were 45 members and 8 guests present at the supper and evening session. The principal topic for discussion was the desirability of getting the State and Federal government to set aside certain representative type areas on state and national forests and to leave them in an undisturbed natural condition. It was also urged that they should acquire areas that have conditions making them particularly valuable for this purpose.

This discussion led up to a discussion of the desirability of having the National Forest Reservation Commission purchase the so-called Waterville Valley property in the White Mt. Purchase area before it is lumbered, as it represents the last area of large size (22,500 acres) in the White Mountains in this condition. Its purchase is being urged by the Society for the Protection of N. H. Forests. The main objection is its cost, \$50 per acre, as it is generally understood that the Federal Government will purchase it eventually as cut-over land after the present owners remove the timber and pulpwood. After considerable discussion a resolution was adopted urging the purchase of Waterville Valley as is, and it was voted to hold our summer meeting there next August.

The election of officers resulted in Prof. Karl Woodward of N. H. University being reelected chairman and H. O. Cook, Mass. Dept. of Conservation, Secretary, R. M. Ross, Forest Commissioner of Vermont, was elected to Executive Committee to represent his state and A. C. Cline of the Harvard Forest to represent Mass. on the committee.

H. O. Cook, *Secretary.*

Central Rocky Mountain Section

The Central Rocky Mountain Section is now a member of the Colorado Engineering Council. This organization is comprised of some fourteen technical and scientific societies in this state such as the American Society of Civil Engineers, Rocky Mountain Technology Club, Colorado Scientific Society and others. It represents over 2,000 members and is strictly a scientific society.

The affiliation of the local chapter of the Society of American Foresters was a recognition of Forestry as a profession and offers a

contact for the establishment of professional relationship with other scientific professions. Foresters will now have equal weight in shaping the views of the council on public questions.

Chairman E. W. Tinker is the local representative on the council with John W. Spencer, vice chairman as an alternate.

The section will shortly put on a program at one of the weekly luncheons usually attended by from 50 to 100 men of high standing in their professions.

Solon H. Williams Dies

On October 27, 1926, passed to the beyond Solon H. Williams, whose memory will be kept green by the action of the California State Board of Forestry in naming after him a grove of State-owned redwood trees. All his life he was a lover of trees. All his life he devoted himself to the problem of conserving them.

As a member of the State Board of Forestry and Deputy State Forester, he rendered most valuable service in acquiring forest lands for parks.

The writer of this inadequate tribute to his memory was his classmate fifty years ago, his friend and admirer ever since. Those who knew him as I did will agree that his passing has left a vacancy in the ranks of active and practical conservationists that will not soon be filled. The good that he did will long live after him.

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